DCS & Labelling Worldwide

CL Series "e"
Thermal Transfer Printers

Operator and Technical Reference Manual for CL408e, CL412e, CL608e & CL612e

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PREFACE

CL SERIES “e” PRINTER OPERATOR’S MANUAL

The CL Series “e” Printer Operator’s Manual contains basic information about the printer such as setup, installation, cleaning and maintenance. It also contains complete instructions on how to use the operator panel to configure the printer. The following is a brief description of each section in this manual.

SECTION 1. PRINTER OVERVIEW

This section contains a discussion of the printer specifications and optional features.

SECTION 2. INSTALLATION AND CONFIGURATION

This section contains instructions on how to unpack and set up the printer, load the labels and ribbon, and how to use the operator panel to configure the printer.

SECTION 3. CLEANING AND MAINTENANCE

This section contains instructions on how to clean and maintain the printer.

SECTION 4. PROGRAMMING

This section introduces the SATO printer programming language. It contains the commands that are used with the printer to produce labels with bar codes, alphanumeric data and graphics.

SECTION 5. INTERFACE SPECIFICATIONS

This section contains the printer’s interface specifications, which include detailed information on how to properly interface your printer to the host system.

SECTION 6. TROUBLESHOOTING

This section contains troubleshooting procedures to follow in the event you have printer problems.

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SECTION 1.
PRINTER OVERVIEW

INTRODUCTION

The SATO CL Series “e” Thermal Transfer Printers are complete, high-performance on-site labeling systems. All printer parameters are user programmable using the front panel controls and the DIP switches. All popular bar codes and 14 human-readable fonts, including a vector font, are resident in memory providing literally thousands of type styles and sizes.

The Operator’s Manual will help you understand the basic operations of the printer such as setup, installation, configuration, cleaning and maintenance.

The major differences in the CL408e and the CL412e printers is the resolution of the head. The CL408e with its 203 dpi head provides an economical labeling solution for most applications. It can print labels up to four inches wide. If a wider label is needed, the CL608e can print labels up to six inches wide at the same resolution. The CL412e provides a higher print resolution, 305 dpi, to give laser-quality printing. It is useful when higher resolution is needed for detailed graphic images. The six inch wide companion printer to the CL412e is the CL612e.

All of the CL Series “e” printers use the same command codes. The only differences are the allowable values representing the print positions on the label. These values are specified in “dots” and will vary depending upon the resolution of the printer and the amount of memory available for imaging the label. The allowable range for each printer is specified in a table for those command codes.

This commonalty makes it very easy to convert labels from one CL printer to another without having to create an entirely different command stream. There are some caveats that must be observed though to compensate for the different resolution print heads. The effect of the different printer resolutions are best illustrated by taking a label designed for a 203 dpi printer and sending the command stream to the its 305 dpi counterpart. The label printed will be an exact two-thirds scale, including the fonts, bar code dimensions and line lengths/widths. The only exception is the PostNet bar code which has only one legal size and the printer resolution is automatically compensated for by the printer. Conversely, a label designed for a 305 dpi printer and sent to its 203 dpi cousin will be one-third larger. It probably will be “truncated” if the label size is larger than the maximum allowable for the printer.

The following general information is presented in this section:

- General Printer Specifications
- Optional Accessories

GENERAL PRINTER SPECIFICATIONS

SPECIFICATION	CL408e	CL412e	CL608e	CL612e
PRINT				
Method	Direct or Thermal Transfer			
Speed (User Selectable)	2 to 6 ips 50 to 150 mm/s		4 to 8 ips 100 to 200 mm/s	
Print Module (Dot Size)	.0049 in. .125 mm	.0033 in. .083 mm	.0049 in. .125 mm	.0033 in. .083 mm
Resolution	203 dpi 8 dpmm	305 dpi 12 dpmm	203 dpi 8 dpmm	305 dpi 12 dpmm
Maximum Print Width	4.1 in. 104 mm		6.0 in. 152 mm	6.5 in. 164mm
Maximum Print Length	49.2 in. 1249 mm	32.8 in. 833 mm	49.2 in. 1249 mm	32.8 in. 833 mm
MEDIA				
Minimum Width	.87 in. (22 mm)		1.96 in. (50 mm)	
Minimum Length	.24 in. (6 mm)		.78 in. (20 mm)	
Maximum Width	5.1 in. (131 mm)		7 in. (178 mm)	
Type	Die Cut Labels, Fan-Fold, Tag Stock or Continuous			
Caliper	.010 in. (.25 mm)			
Roll OD (max)	8.6 in. (218 mm), Face-In Wind			
Core ID (min)	1.5 in. (38 mm)			
Core ID (Recommended)	3 in. (76 mm)			
SENSING				
Transmissive See-thru	Movable			
Reflective Eye-Mark	Movable		Fixed	
Continuous Form	Sensor not used			
RIBBON				
Maximum Width	4.4 in. (111 mm)		6.75 in. (172 mm)	
Length	1475 ft. (450 m)		1345 ft (410 m)	
Thickness	4.5 micron, Face-In Wind			

All specifications subject to change without notice.

SPECIFICATION	CL408e	CL412e	CL608e	CL612e
CONTROLS AND SIGNALS				
On-Line LED	Status = Green(1)		Green	
Power LED	None		Green	
Media Out LED	Status = Red(1)		Red	
Ribbon Out LED	Status = Red(1)		Red	
Error LED	Status = Red(1)		Red	
LCD Panel	2 Line x 16 Character			
On/Off-Line Switch	Front Panel			
Label Feed Switch	Front Panel			
Power On/Off Switch	Rear Panel			
POTENTIOMETER ADJUSTMENTS				
Print Darkness	Front Panel			
Pitch	Front Panel			
Offset	Front Panel			
Display	None			Front Panel
INTERFACE MODULES				
Parallel	IEEE1284 Parallel			
Serial	RS232C (9600 to 57,600 bps) RS422/485 (9600 to 57,600 bps)			
Serial Protocol	Hardware Flow Control (Ready/Busy) Software Flow Control (X-On/X-Off) Bi-directional Status			
Universal Serial Bus	USB Version 1.1			
Ethernet	10/100BaseT			
Data Transmission	ASCII Format			
PROCESSING				
CPU	32 Bit RISC			
Flash ROM	2 MB			
SDRAM	16 MB			
Receive Buffer	2.95 MB			
Optional Flash ROM	4 MB			
Optional PCMCIA Memory	16 MB Flash or 4 MB SRAM			
(1) Single two color (Red, Green) LED.				

All specifications subject to change without notice.

CHARACTER FONTS

SPECIFICATION	CL408e	CL608e	CL412e	CL612e
MATRIX FONTS				
U Font	(5 dots W x 9 dots H)			
S Font	(8 dots W x 15 dots H)			
M Font	(13 dots W x 20 dots H)			
XU Font	(5 dots W x 9 dots H) Helvetica			
XS Font	(17 dots Wx 17 dots H) Univers Condensed Bold			
XM Font	(24 dots W x 24 dots H) Univers Condensed Bold			
OA Font	(15 dots W x 22 dots H) OCR-A		(22 dots W x 33 dots H) OCR A	
OB Font	20 dots W x 24 dots H) OCR-B		(30 dots W x 36 dots H) OCR B	
AUTO SMOOTHING FONTS				
WB	WB Font (18 dots W x 30 dots H)			
WL	WL Font (28 dot W x 52 dots H)			
XB	XB Font (48 dots W x 48 dots H) Univers Condensed Bold			
XL	XL Font (48 dot W x 48 dots H) Sans Serif			
VECTOR FONT				
	Proportional or Fixed Spacing Font Size 50 x 50 dots to 999 x 999 dots Helvetica, 10 Font Variations			
AGFA® RASTER FONTS				
A Font	CG Times, 8 to 72 pt			
B Font	CG Triumvirate, 8 to 72 pt			
DOWNLOADABLE FONTS				
	Bit Mapped TrueType Fonts with Utility Program			
CHARACTER CONTROL				
	Expansion up to 12X in either the X or Y coordinates Character Pitch control Line Space control Journal Print facility 0°, 90°, 180° and 270° Rotation			

All specifications subject to change without notice.

BAR CODES

SPECIFICATION	CL408e	CL608e	CL412e	CL612e
SYMBOLOGIES				
	Bookland (UPC/EAN Supplemental) EAN-8, EAN-13 CODABAR Code 39 Code 93 Code 128 Interleaved 2 of 5 Industrial 2 of 5 Matrix 2 of 5 MSI POSTNET UCC/EAN-128 UPC-A and UPC-E Data Matrix Maxicode PDF417 Micro PDF417 Truncated PDF417 QR Code			
Ratios	1:2, 1:3, 2:5 User definable bar widths			
Bar Height	4 to 600 dots, User programmable			
Rotation	0°, 90°, 180° and 270°			
OTHER FEATURES				
Sequential Numbering	Sequential numbering of both numerics and bar codes			
Custom Characters	RAM storage for special characters			
Graphics	Full dot addressable graphics, SATO Hex/Binary, .BMP or .PCX formats			
Form Overlay	Form overlay for high-speed editing of complex formats.			

All specifications subject to change without notice.

PHYSICAL

SPECIFICATION	CL408e	CL412e	CL608e	CL612e
DIMENSIONS				
Wide	10.7 in. (271 mm)		13.8 in. (352 mm)	
Deep	16.9 in. (430 mm)		16.9 in. (429 mm)	
High	12.6 in. (321 mm)		11.7 in. (298 mm)	
WEIGHT	28.7 lbs (13 Kg)		41.9 lbs (19 Kg)	
POWER REQUIREMENTS				
Voltage	110 V (±10 %) 220V (±10 %) 50/60 Hz (±1%)			
Power Consumption	50W Idle 130W Operating		50W Idle 210W Operating	
ENVIRONMENTAL				
Operating Temperature	41° to 104°F (5° to 40°C)			
Storage Temperature	-0° to 104°F (-20° to 40°C)			
Operating Humidity	15-85 % RH, non-condensing			
Storage Humidity	Max 90% RH, non-condensing			
Electrostatic Discharge	8KV			
REGULATORY APPROVALS				
Safety	UL, CSA			
RFI/EMI	FCC Class A			

All specifications subject to change without notice.

OPTIONAL ACCESSORIES

ACCESSORY	CL408	CL412	CL608	CL612
MEMORY EXPANSION	One slot for PCMCIA Memory Cards (up to 16 MB Flash or 4 MB SRAM) and/or 4MB internal Flash ROM. Can be used for Graphic File storage, print buffer expansion, format storage and downloaded TrueType fonts.			
CALENDAR	An internally mounted Date/Time clock that can be used to date/time stamp labels at the time of printing.			
LABEL CUTTER	Internal attachment allowing labels to be cut at specified intervals. Controlled through programming.			
LABEL DISPENSER	Internal attachment allowing labels to be peeled from backing for immediate (on demand) application. Internal backing take-up.		Internal attachment allowing labels to be peeled from backing for immediate (on demand) application. Backing take-up mounted externally to rear of printer.	
LABEL REWINDER	External option rewinds labels onto a roll after they are printed.			
PARALLEL INTERFACE	IEEE1284 Parallel Interface Module			
SERIAL INTERFACE	High Speed Serial RS232 Interface Module			
UNIVERSAL SERIAL I/F	USB Interface Module			
ETHERNET INTERFACE	10/100BaseT Interface Module			
COAX/TWINAX INTERFACE	Coax/Triax Interface Module. Coax I/F emulates an IBM 3287-2 printer with a standard Type A BNC connector. Twinax I/F emulates IBM 5224, 5225, 5226 or 4214 printers with auto-terminate/cable-thru capabilities.			

All specifications subject to change without notice.

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SECTION 2.
INSTALLATION AND CONFIGURATION

INTRODUCTION

This section is provided to assist you in taking the CL Series Printer from the shipping container to the application environment. Where the physical differences between the printer models are significant (such as loading paper and ribbons), separate sections for each of the models are used for clarity.

The following information is provided in this section:

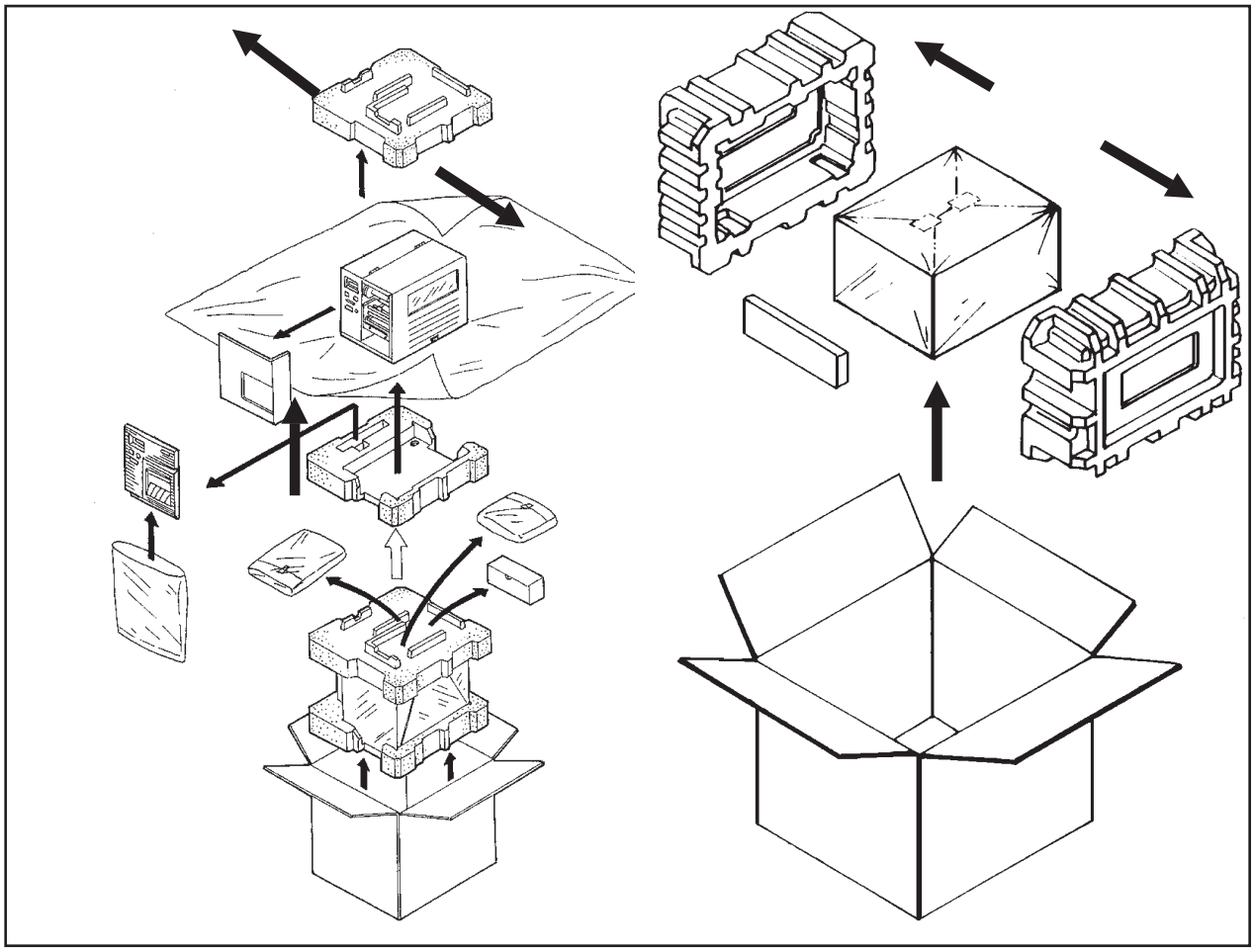
- Unpacking and Parts Identification
- Setting Up the Printer
- Loading Labels or Tags
- Loading the Ribbon
- Operator Panel
- Printer Configuration

UNPACKING AND PARTS IDENTIFICATION

Consider the following when unpacking the printer:

- The box should stay right-side up.
- Lift the printer out of the box carefully.
- Remove the plastic covering from the printer.
- For the CL4XX printers, remove the Front Access Door from its protective bag and attach it to the printer.
- Remove the accessory items from their protective containers.
- If the printer has been stored in a cold environment, allow it to reach room temperature before powering it on.
- Set the printer on a solid, flat surface. Inspect the shipping container and printer for any signs of damage that may have occurred during shipping.

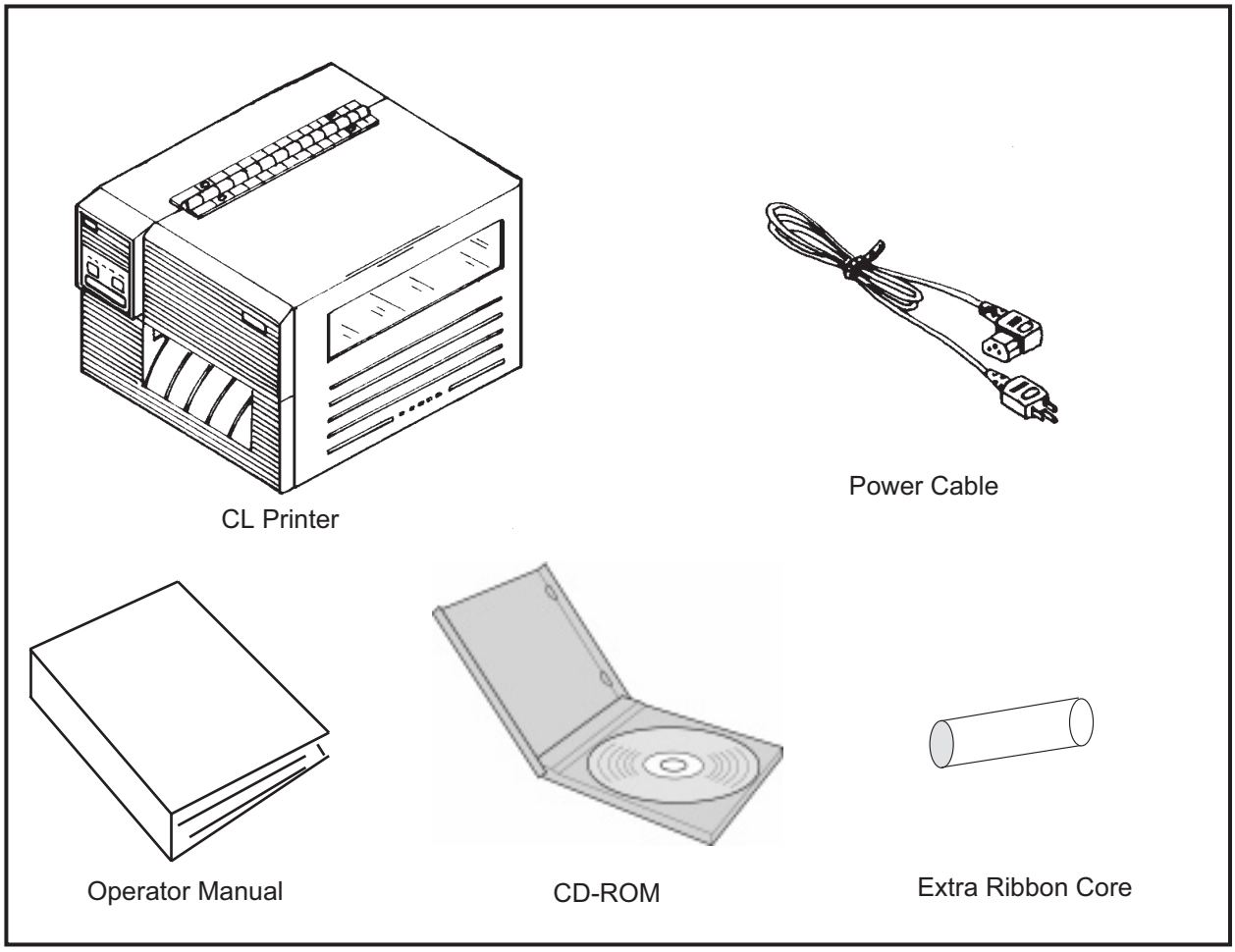
NOTE: The following illustrations are representative only. Your printer may not be packed exactly as shown here, but the unpacking steps are similar.



CL4XX Packaging **CL6XX Packaging**

Verify that you have the following materials when unpacking:

- Printer and Power Cable
- Operator Manual
- Extra Ribbon Core
- CD-ROM



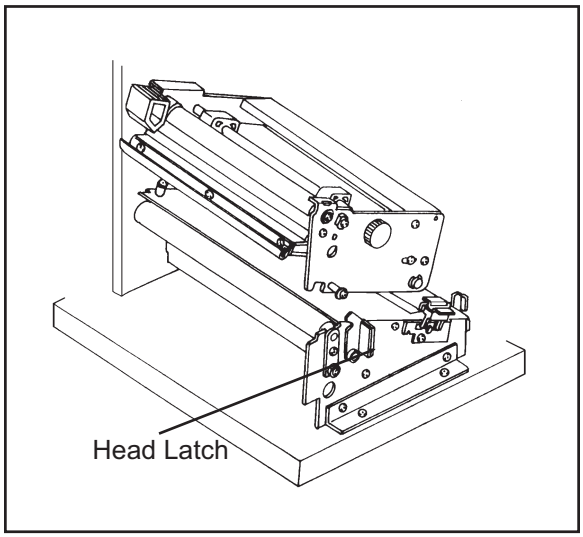
SETTING UP THE PRINTER

Consider the following when setting up the printer:

- Locate a solid flat surface with adequate room to set the printer. Make sure there is enough room at the top and right-hand (facing the printer) side to provide clearance for the label access door to swing open.
- The location should be near the host computer or terminal. The maximum distance for RS232 cables is 35 feet and six feet for IEEE1284 Parallel cables. Cables can be purchased locally, and their configuration will depend upon the host system being used.
- For information on interfacing the printer to a host system, see *Section 6: Interface Specifications*.

LOADING LABELS, TAGS AND RIBBON — CL608e and CL612e

LOADING LABELS OR TAGS



1. Open the **Side Access Door** by swinging it up and to the left. The hinge system automatically dampens the movement to prevent the door from inadvertently falling and possibly causing injury to the operator.

2. Open the **Print Head Assembly** by pushing the **Head Latch** toward the rear of the printer. The **Print Head Assembly** is spring-loaded and will automatically open as soon as the **Head Latch** is disengaged.

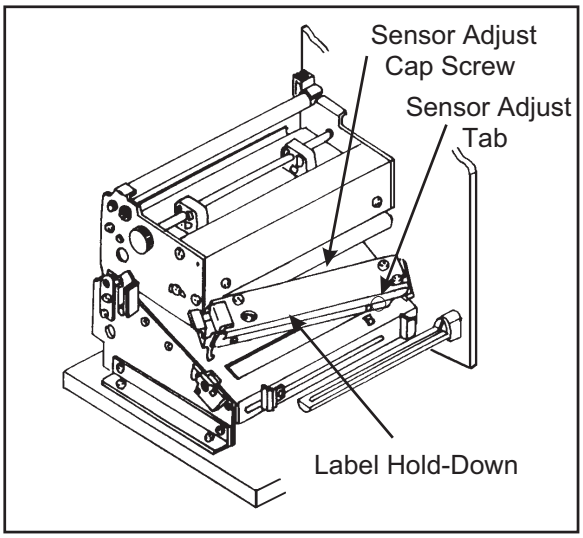
3. Push the **Label Supply Guide** to the outside of the printer to give the maximum label width.

4. Release the **Label Roll Support** by pulling outward at the top and swing it down and out of the way.

5. If using roll labels (or tags), load the roll onto the **Label Supply Spindle** so that the printing side of the labels faces upwards as it unwinds from the roll. The labels should be wound face-in. Push the roll all the way to the inside of the printer and push the **Label Supply Guide** snugly against the outside of the label roll.

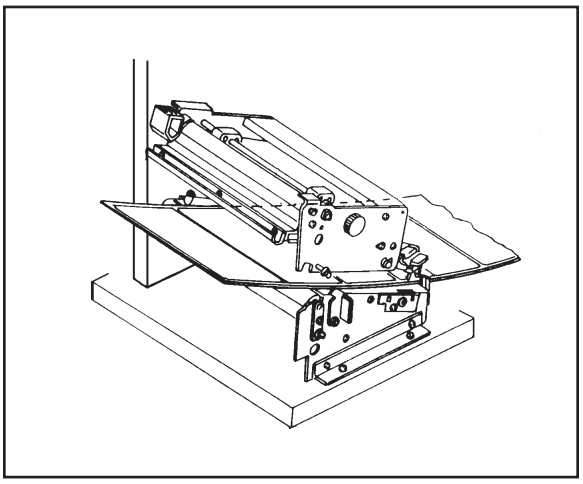
6. If using fanfold labels (or tags) set them on a flat surface behind the printer. Pass the labels (printing side up) through the slot and under the **Label Supply Spindle**.

7. Open the **Label Hold-Down** by squeezing the green tab and the release tab together. The Label Hold-down is spring loaded and will open automatically when the latch is disengaged. Feed the labels under the **Label Guide**, under the **Label Hold-Down**, through the **Print Head Assembly** and out the front of the printer.



8. Inspect the label routing and verify that the path matches that illustrated in the Label Loading

diagram. Set the **Adjustable Label Guide** to keep the labels against the inside of the printer.



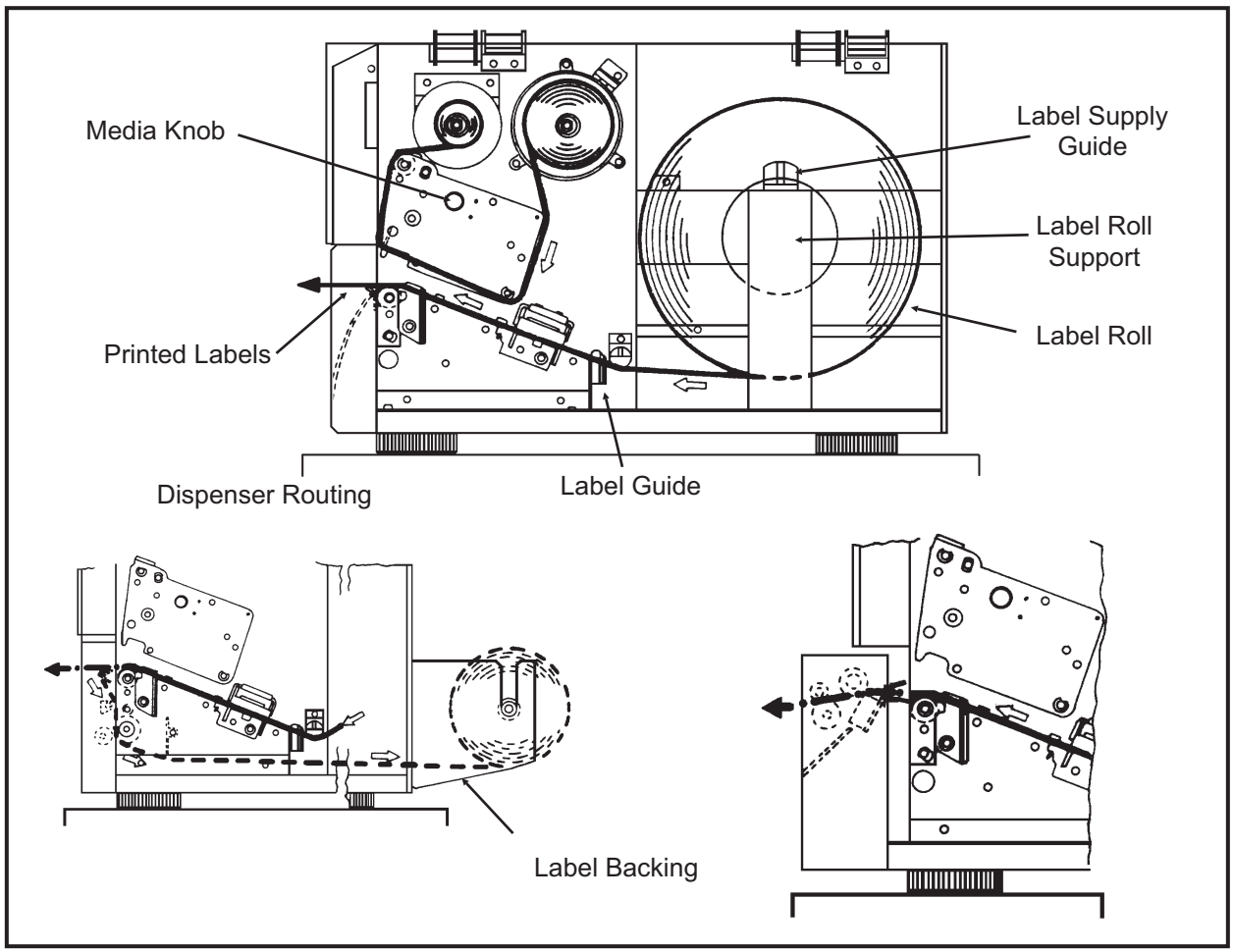
9. Close the **Label Hold-Down** by pushing downward on the green tab until it latches closed.

NOTE: If the Label Dispenser option has been purchased, see Appendix D, for proper label routing instructions.

10. Adjust the **Label Sensor Assembly** to the correct position by loosening the **Sensor Adjust Cap Screw** located on the front side of the **Label Hold-Down** and moving the **Sensor Adjust Tab** to the correct position. After it is correctly positioned, retighten the **Sensor Adjust Cap Screw**.

11. If the ribbon is already loaded, close the **Print Head Assembly** by pushing downward on the green tab until it latches closed.

12. If the ribbon is not loaded, see the following description for loading instructions.



12. Adjust the **Media Knob** based on the media you have loaded. For media up to 2.3 inches wide, use the "1" position, for media between 2.3 and 4.6 inches wide, use the "2" position. For media wider than 4.6 inches, use the "3" position. If you use media narrower than 7 inches, using the wrong setting can void the print head warranty due to the excessive pressure.

    Caution: Using media narrower than the maximum print width may cause excess head wear due to the label edge.

LOADING THE RIBBON

1. Open the **Side Access Door** by swinging it up and to the left. The hinge system automatically dampens the movement to prevent the door from inadvertently falling and possibly causing injury to the operator.

2. Open the **Print Head Assembly** by pushing the **Head Latch** toward the rear of the printer. The **Print Head Assembly** is spring-loaded and will automatically open as soon as the **Head Latch** is disengaged.

3. Locate the **Extra Ribbon Core** supplied with the printer. Place the core on the **Ribbon Rewind Spindle**, pushing it all the way to the inside of the spindle. *Note that the new empty core of each subsequent roll becomes the next rewind core.*

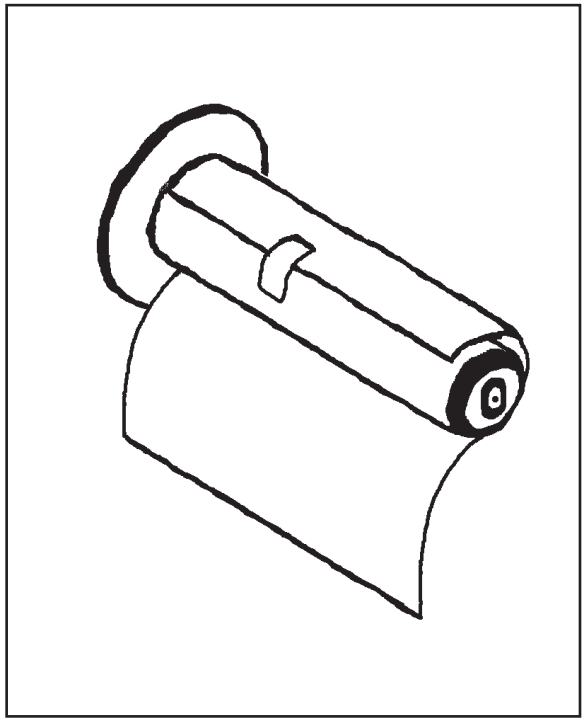
4. Load the ribbon onto the **Ribbon Supply Spindle**, also pushing it all the way to the inside of the spindle. The dull side of the ribbon should be facing down as it travels through the **Print Head Assembly**.

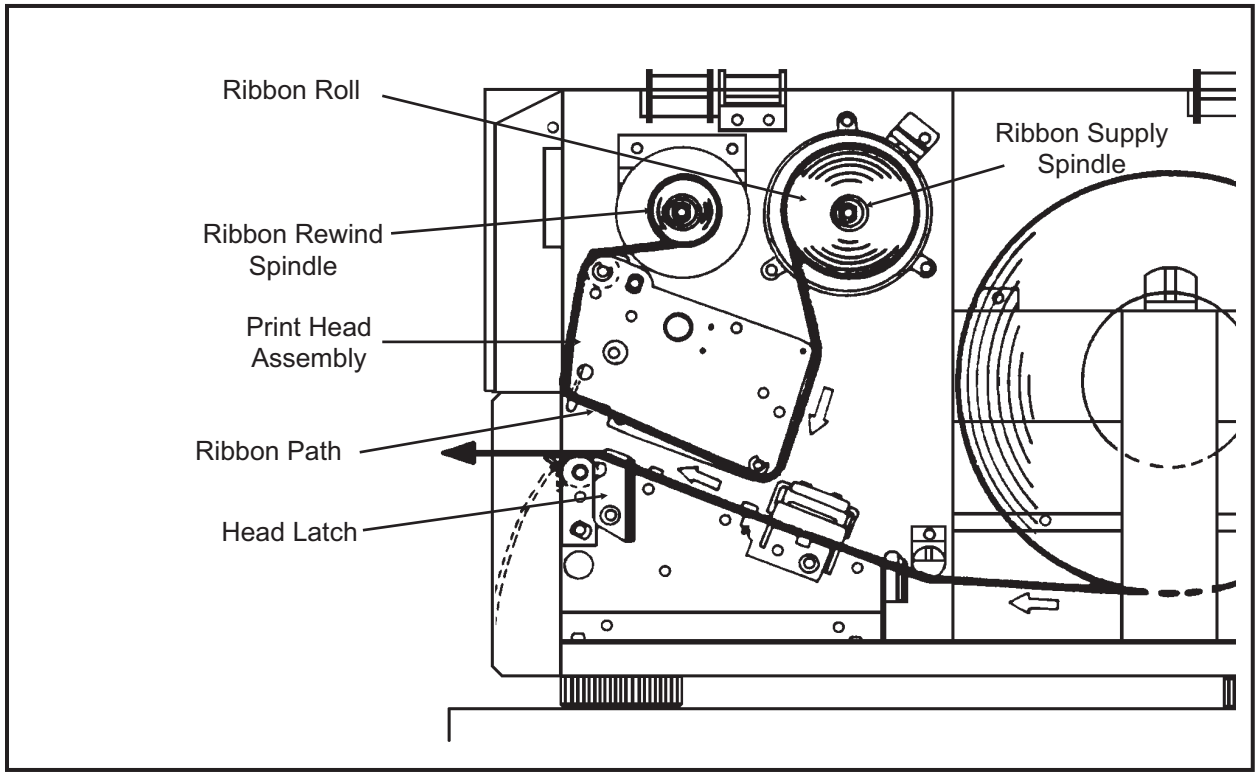
5. Feed the leader portion of the ribbon through the **Print Head Assembly** and up to the **Ribbon Rewind Spindle** following the routing shown in the diagram.

6. Load the ribbon behind and over the top of the **Ribbon Rewind Spindle** and tape it to the **Extra Ribbon Core**. Make sure it matches the ribbon path shown in the diagram.

7. Manually turn the **Rewind Spindle** to wrap the ribbon onto the core one to two turns to secure it.

8. If the labels or tags are already loaded, close the **Print Head Assembly** by pushing downward on the green tab until it latches closed.





NOTE: Run a test print to ensure that the labels and ribbons were loaded correctly. See the "Test Print Mode" of Section3: Configuration for instructions on how to run test prints.

CAUTION: If your labels are less than the full width of the print head, the outside edge will eventually wear out a small portion of the print head, resulting in an area that will not print. Special care must be taken if you plan to use multiple widths of labels, since the damaged portion of the print head caused from edge wear on a more narrow label may affect the printing on a wider label. We suggest you plan your print formats carefully to avoid using the area of possible damage on the print head when using a wider label. The small area of damage will have no effect on printing with the undamaged part of the print head.

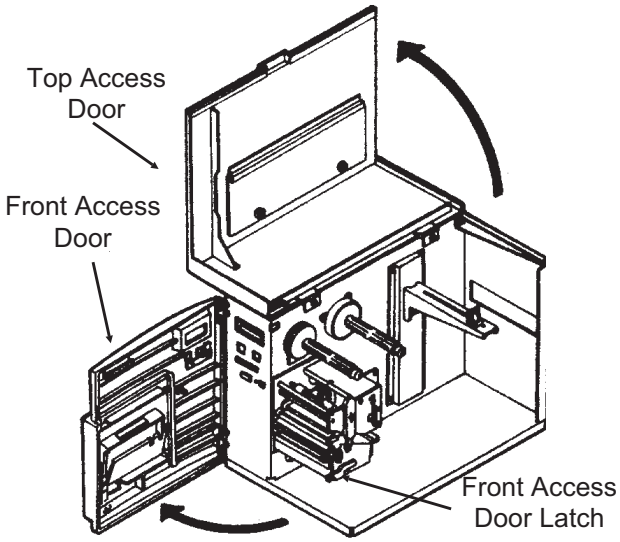
Damage from a label edge is physical damage and is unavoidable. It is not covered by warranty. It is possible to delay such damage by always ensuring that the ribbon used is wider than the label stock. This will help to protect the print head from label edge damage.

LOADING LABELS, TAGS AND RIBBON — CL408e and CL412e

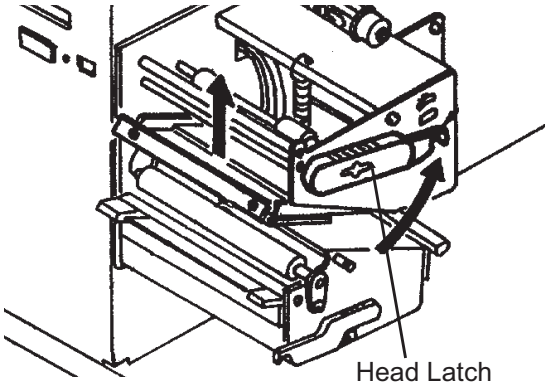
LOADING LABELS AND TAGS

1. Open the **Top Access Door** by swinging it up and to the left. Open the **Front Access Door** by pushing down on the green Front Cover Latch and swinging the door forward and to the left. This gives access to the print mechanism on three sides

   Note: The Top Access Door must be open before the Front Access Door can be opened.

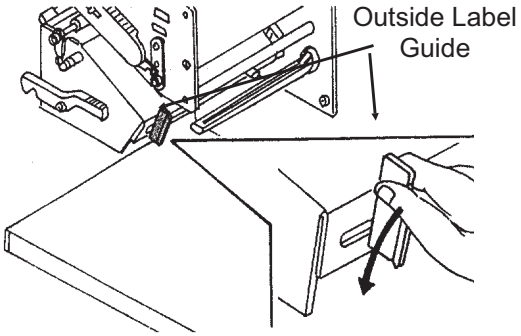


2. Open the **Print Head Assembly** by rotating the green **Head Latch** counter clockwise. The head is spring loaded and will automatically raise to the opened position

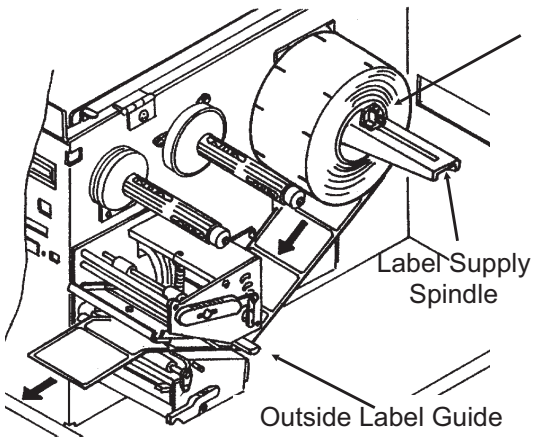


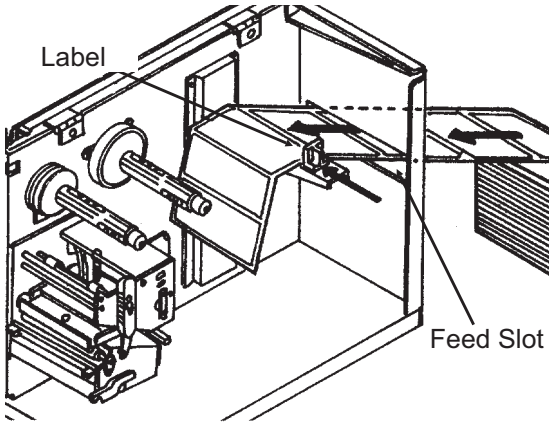
3. Push the **Label Supply Guide** to the outside of the printer to give the maximum label width.

4. Clear access is provided to the label path by pulling the top of the **Outside Label Guide** down.

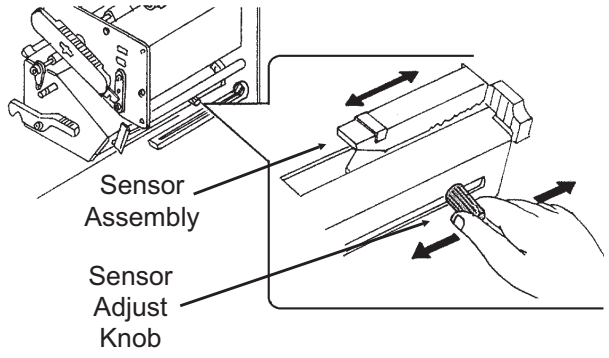


5. If using roll labels (or tags), load the roll onto the **Label Supply Spindle** so that the printing side of the labels faces upwards as it unwinds from the roll. Push the roll all the way to the inside of the printer, raise the **Label Supply Guide** and adjust its position until it fits snugly against the outside of the label roll.



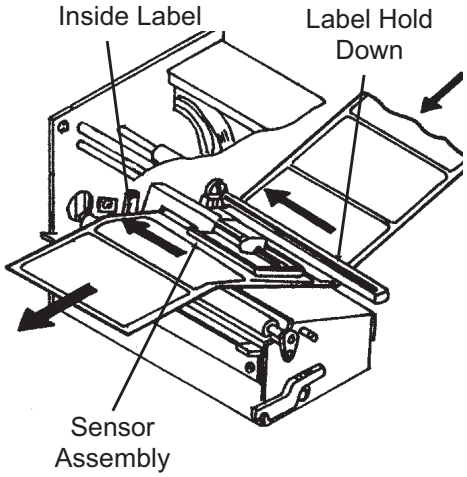


6. If using fanfold labels (or tags) set them on a flat surface behind the printer and remove the cover from the **Feed Slot** on the rear panel. Pass the labels (printing side up) through the slot and over the **Label Supply Spindle**.



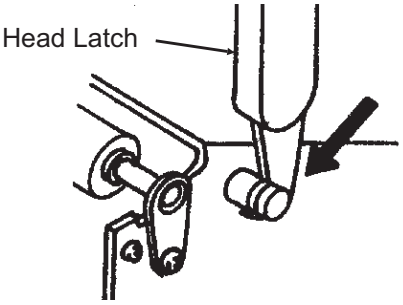
7. Route the labels under the **Label Hold-Down**, through the **Label Sensor Assembly**, under the Print Head and out the front of the print mechanism. Push the labels all the way to the inside of the printer until they touch the **Inside Label Guide**.

   Note: Make sure the labels are routed through the Label Sensor Assembly. If they are not, the printer will react as if there are no labels loaded and will refuse to print.



8. Adjust the **Label Sensor Assembly** loosening the green **Sensor Adjust** knob located on the bottom side of the **Label Transport Assembly** and moving the assembly to the correct position. After it is correctly positioned, retighten the green **Sensor Adjust** knob.

9. Raise the **Outside Label Guide** to the closed position and push the guide inward until it barely contacts the outside edge of the labels.



10. If Ribbon is already loaded in the printer, close the **Print Head** and latch it in the down position.

11. Inspect the label routing and verify that the path matches that illustrated in the Label Loading diagram on the inside of the **Top Access Door**.

12. Carefully feed several labels through the opening in the **Front Access Door** and close it. After the **Front Access Door** is closed, the **Top Access Door** may be closed. These covers have interlock switches and the printer will not operate if either is open.

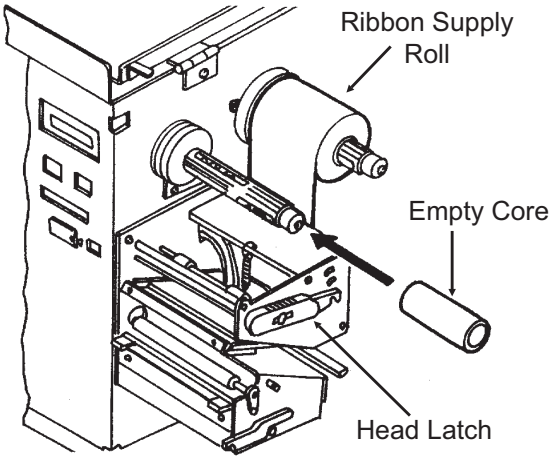
NOTE: If the Label Dispense Option has been purchased, see Appendix D, Optional Accessories for instructions on how to route the label backing. For information on how to enable this option, see Section 3: Printer Configuration.

LOADING THE RIBBON

1. Open the **Top** and **Front Access Doors**.

2. Open the **Print Head Assembly** by rotating the green the **Head Latch** counter clockwise. The print head is spring loaded and will raise to the open position as soon as the latch is released.

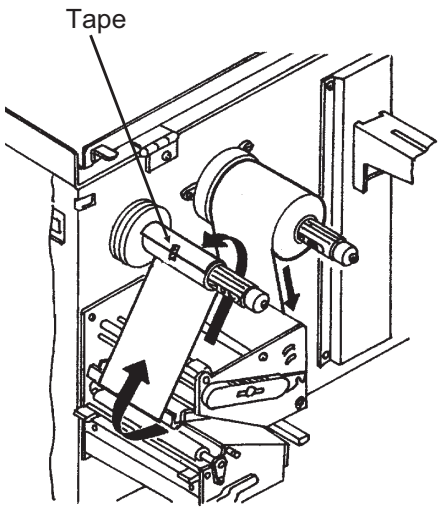
3. Locate the **Extra Ribbon Core** supplied with the printer. Place the core on the **Ribbon Rewind Spindle**, pushing it all the way to the inside of the spindle. *Note that the new empty core of each subsequent roll becomes the next rewind core.*



4. Load the ribbon onto the **Ribbon Supply Spindle**, pushing it all the way to the inside of the spindle. The dull side of the ribbon should be facing down as it travels through the **Print Head Assembly**.

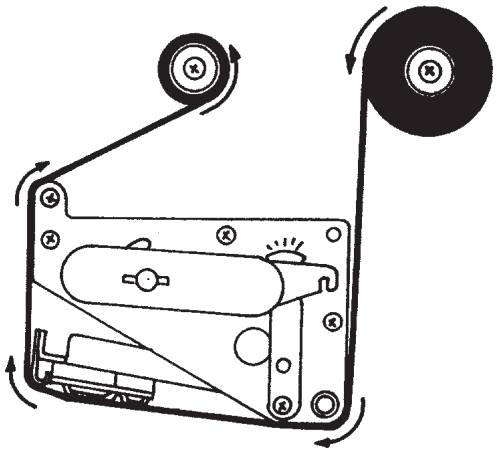
5. Feed the leader portion of the ribbon through the **Print Head Assembly** and up to the **Ribbon Rewind Spindle** following the routing shown in the diagram.

6. Load the ribbon behind and over the top of the **Ribbon Rewind Spindle** and tape it to the **Extra Ribbon Core**. Make sure it matches the ribbon path shown in the diagram.

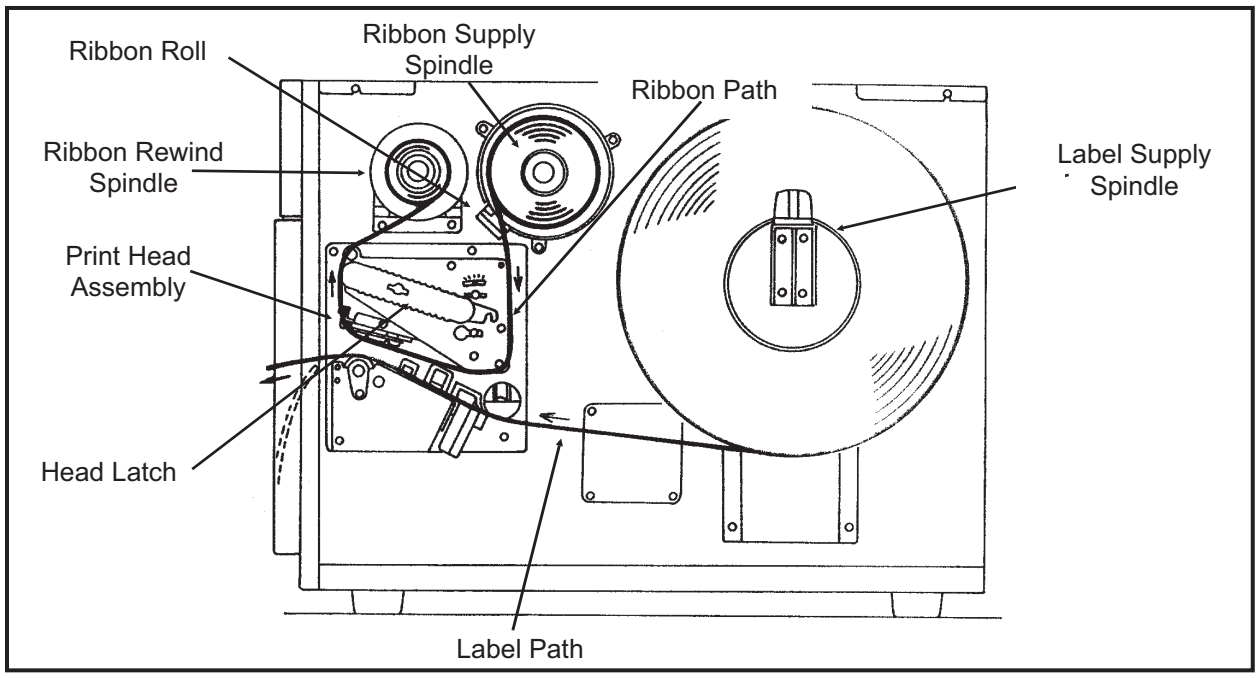


7. Manually turn the **Ribbon Rewind Spindle** to wrap the ribbon onto the core one to two turns to secure it.

8. If the labels or tags are already loaded, close the **Print Head Assembly** by rotating the green **Head Latch** clockwise until it latches closed and close the **Front and Top Access Doors.**



NOTE: Run a test print to ensure that the labels and ribbons were loaded correctly. See the "User Test Print" section of Section 3 for instructions on how to run test prints.



CAUTION: If your labels are less than the full width of the print head, the outside edge will eventually wear out a small portion of the print head, resulting in an area that will not print. Special care must be taken if you plan to use multiple widths of labels, since the damaged portion of the print head caused from edge wear on a more narrow label may affect the printing on a wider label. We suggest you plan your print formats carefully to avoid using the area of possible damage on the print head when using a wider label. The small area of damage will have no effect on printing with the undamaged part of the print head.

Damage from a label edge is physical damage and is unavoidable. It is not covered by warranty. It is possible to delay such damage by always ensuring that the ribbon used is wider than the label stock. This will help to protect the print head from label edge damage.

LABEL SENSOR ADJUSTMENTS — CL608e and CL612e

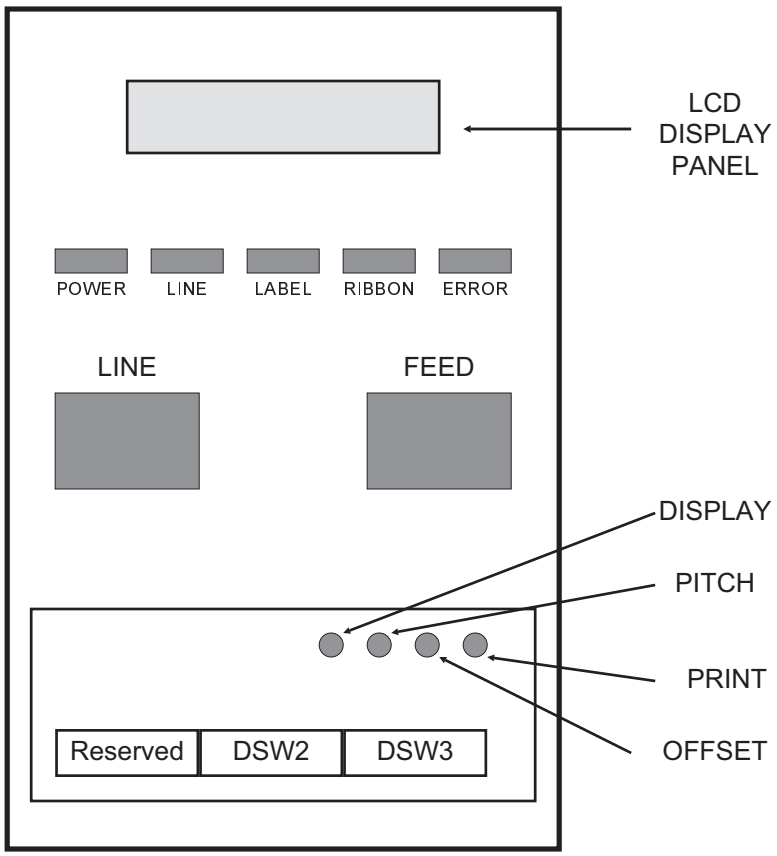
The Gap (transmissive) sensor on the CL608e and CL612e can be adjusted over a limited range. It is located in the **Label Hold-Down Assembly** and can be adjusted by loosening the **Sensor Adjust Cap Screw** on the front of the **Label Hold-Down** and sliding the **Sensor Adjust Tab** to the desired position. The Gap sensor can be adjusted from a minimum of 1.0 in. (25mm) to a maximum of 3.5 in. (90mm). The Eye Mark sensor is fixed at 0.33 in. (9mm).

LABEL SENSOR ADJUSTMENTS — CL408e and CL412e

Both the Eye-Mark (refelective)and Gap (transmissive) sensors on the CL408e and CL412e can be adjusted over a limited range. They are both located in the **Label Sensor Unit**. The assembly can be adjusted by loosening the green **Sensor Adjust** knob located underneath the **Label Transport Assembly** and sliding the **Label Sensor Unit** to the desired position. The Gap sensor can be adjusted from a

minimum of 0.67 in. (17mm) to a maximum of 2.5 in. (64 mm), and the Eye-Mark from a minimum of 0.25 in. (6mm) to a maximum of 2.1 in. (53mm).

OPERATOR PANEL — CL608e and CL612e



The **CL608e/CL612e Operator Panel** consists of five LED indicators, two momentary contact switches, three DIP switches, four adjustment potentiometers and one LCD Display. All of these are accessible from the front of the printer. They are used to set the printer operating parameters and to indicate the status of the printer to the operator. After you power on the printer, familiarize yourself with the keys and indicators as it will help you understand the configuration process.

PRINT: Potentiometer to adjust print darkness (fine tuning).

OFFSET: Potentiometer to adjust amount of back/forward feed for dispenser/cutter/tear-off bar position (+/-3.75 mm)

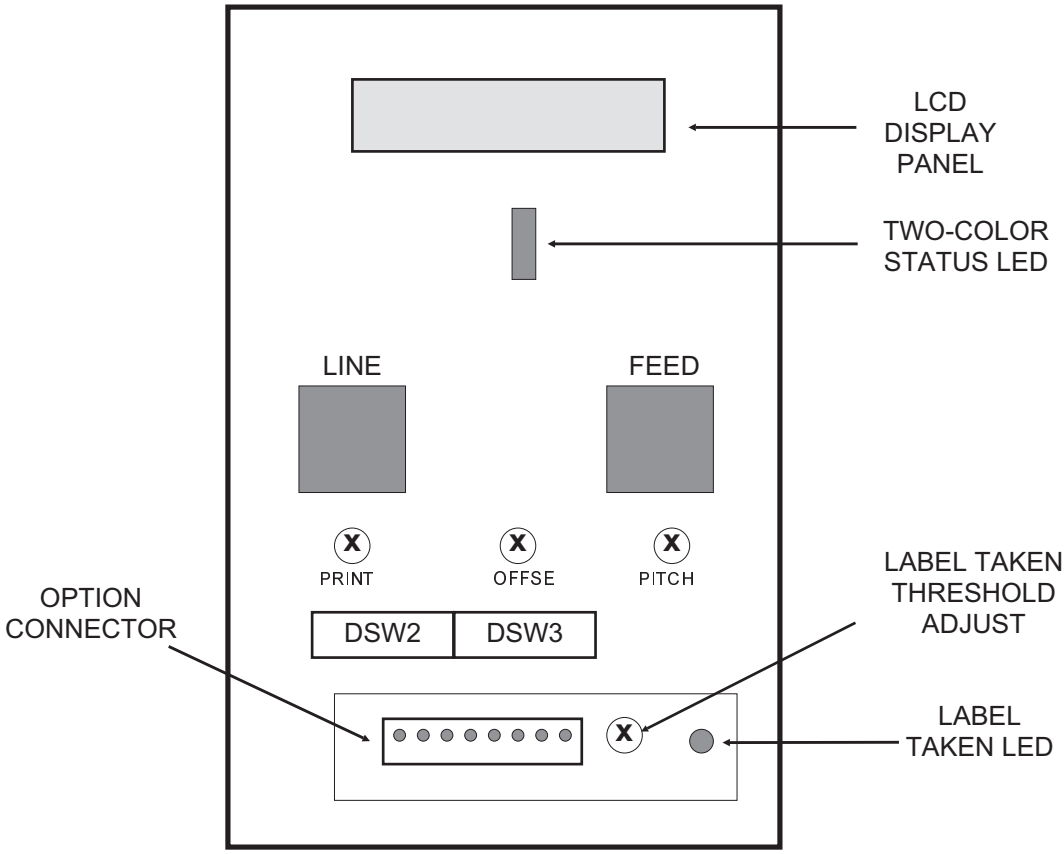
PITCH: Potentiometer to adjust home position of the label (+/- 3.75 mm). Affects stop position of label feed, print position and dispense position.

DISPLAY: Potentiometer to adjust the contrast of the LCD.

POWER: LED, illuminated when the power is on.

LABEL:	LED, illuminated when label supply is out.
RIBBON:	LED, illuminated when ribbon motion sensor does not detect any ribbon motion.
ERROR:	LED, illuminated when there is a system fault such as an open print head.
ONLINE:	LED, illuminated when printer is ready to receive data. It is turned on and off by toggling the LINE key. This indicator will blink while the printer is receiving data.
LINE:	Momentary switch. Pressing this key toggles the printer between the on-line and off-line mode. When the printer is on-line, it is ready to receive data from the host. This key acts as a pause during a print job by taking the printer off-line. It can also be used as a ***Pause*** function key to stop label during the printing process.
FEED:	Momentary switch. Pressing this key feeds one blank label through the printer when it is off-line. When the printer is on-line, another copy of the last label will be printed.
DSW2-3:	Located behind the Front Access Door. DIP switch array to set operational parameters of the printer. DSW1 is used to set the RS232 parameters and is located on the RS232 interface board.
LCD:	2 Line x 16 Character LCD display. Used for setting operational parameters of the printer.

OPERATOR PANEL CL408e and CL412e



Note: DSW1 (RS232 Parameter Select) is located on the RS232 Interface Board.

The **CL408e/CL412e Operator Panel** consists of one two-color (red and green) LED indicator, two momentary contact switches, two DIP switches (a third is located on the RS232 interface card), four adjustment potentiometers and one LCD Display. All of these are accessible from the front of the printer, however some are not accessible unless the front cover is open. They are used to set the printer operating parameters and to indicate the status of the printer to the operator. After you power on the printer, familiarize yourself with the keys and indicators as it will help you understand the configuration process.

PRINT: Located behind the Front Access Door. Potentiometer to adjust print darkness (fine tuning).

OFFSET: Located behind the Front Access Door. Potentiometer to adjust amount of back/forward feed for dispenser/cutter/tear-off bar position (+/- 3.75 mm)

PITCH: Located behind the Front Access Door. Potentiometer to adjust home position of the label (+/- 3.75 mm). Affects stop position of label feed, print position and dispense position.

STATUS: Two-color (Red, Green) LED that indicates the following status conditions:

Green - Illuminated when printer is ready to receive data. It is turned on and off by toggling the LINE key.

Red -Illuminated when there is a system fault such as an open print head.

LINE: Momentary switch. Pressing this key toggles the printer between the on-line and off-line mode. When the printer is on-line, it is ready to receive data from the host. This key acts as a pause during a print job by taking the printer off-line. It can also be used as a ***Pause*** function key to stop label during the printing process.

FEED: Momentary switch. Pressing this key feeds one blank label through the printer when it is off-line. When the printer is on-line, another copy of the last label will be printed.

DSW2-3: Located behind the Front Access Door. DIP switch array to set operational parameters of the printer. DSW1 is used to set the RS232 parameters and is located on the RS232 interface board.

LCD: 2 Line x 16 Character LCD display. Used for setting operational parameters of the printer.

LABEL TAKEN THRESHOLD: Located behind the Front Access Door. This potentiometer is used to adjust the sensing level of the Label Taken Sensor. Active only when the Label Dispense option is installed.

OPTION CONNECTOR: Located behind the Front Access Door. This connector is used for the cutter and dispenser optional accessories.

LABEL TAKEN: Located behind the Front Access Door. This LED is illuminated when a label is not present in the Label Taken Sensor. If it is not illuminated, a label has been detected in the sensor and printing will be inhibited until it is removed. This LED is active only when the Label Dispense option is installed. It is used to adjust the Label Taken Sensor threshold.

REAR PANEL — CL608e and CL612e

Power On/Off Switch: Turns power On or Off.

AC Input: Input 115V 50/60 Hz connector. Use the cable provided.

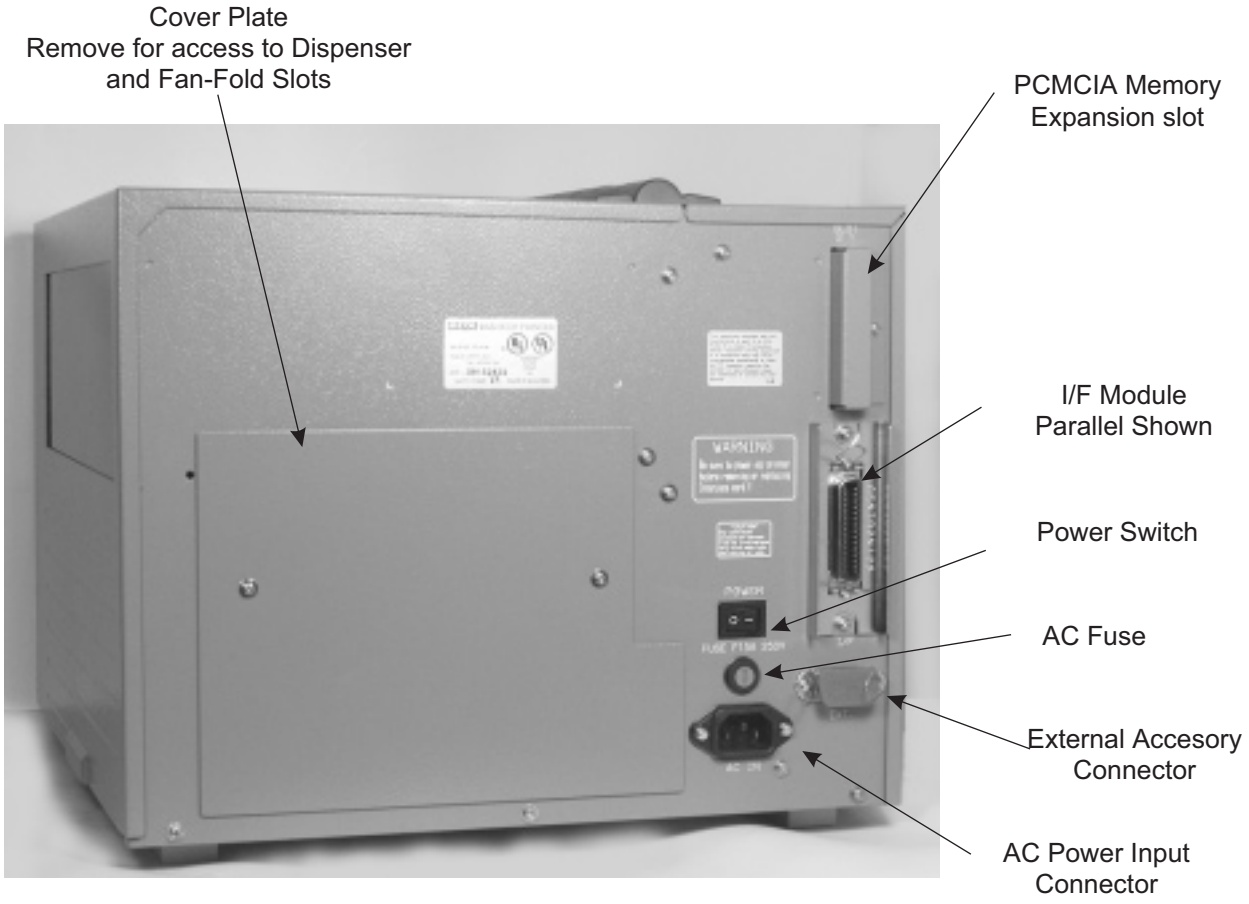
AC Fuse: Input power protection. Type 3A/250V.

Interface Slot: Slot to plug in an interface adapter. An adapter must be connected before the printer is operational.The adapter types available are:

- RS232C Serial I/F Module, DB-25P.
- IEEE1284 Parallel I/F Module, AMP 57-40360
- Universal Serial Bus I/F Module, USB-B
- Ethernet 10/100BaseT I/F Module, RJ-45

Memory Card Slot: Two connectors for optional PCMCIA Memory Cards.

EXT: External signal connector, AMP 57-60140.



REAR PANEL — CL408e and CL412e

Power: Switch to turn power On or Off.

AC Input: Input 115V 50/60 Hz connector. Use the cable provided.

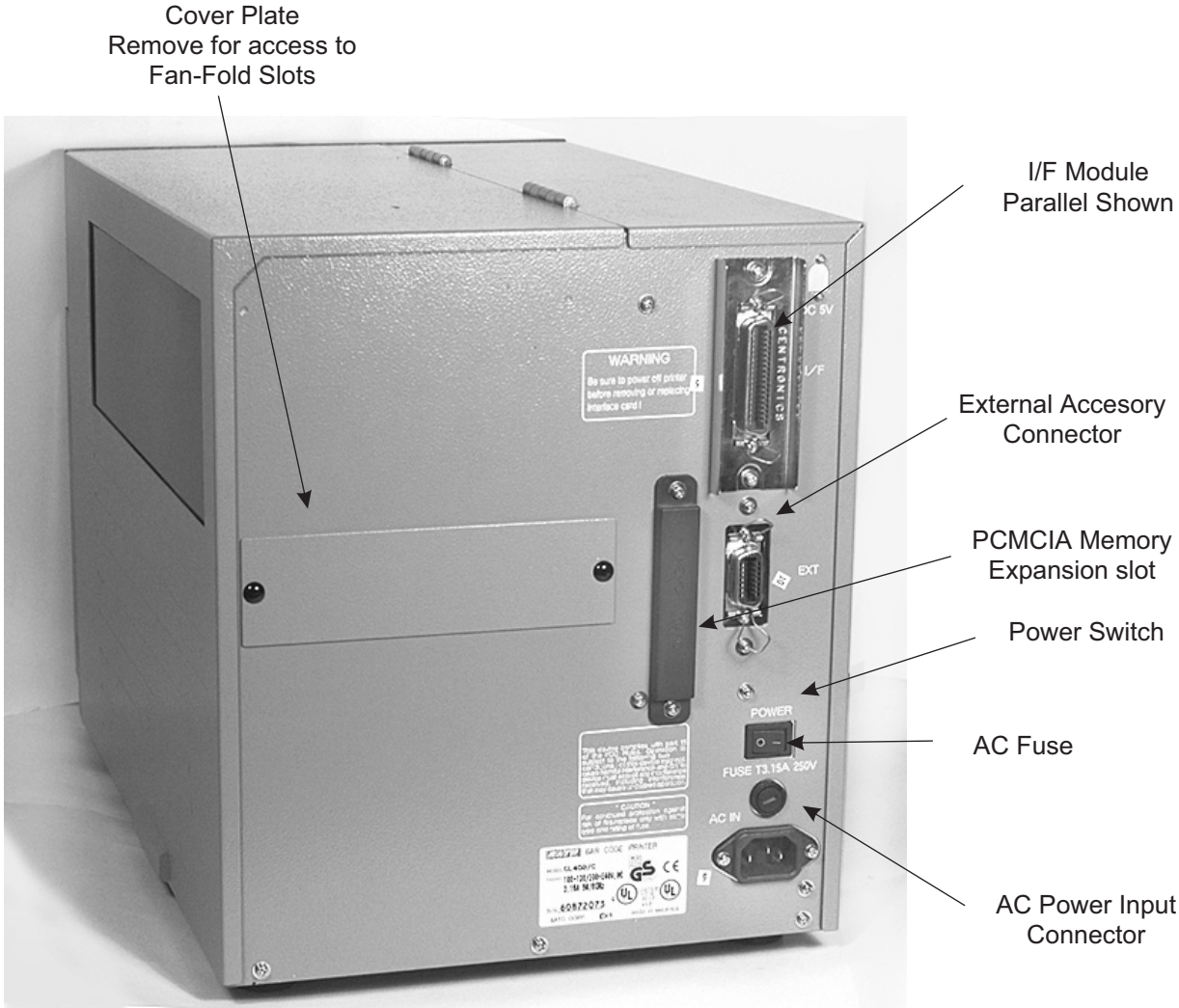
AC Fuse: Input power protection. Type 3A/250V.

Interface Slot: Slot to plug in an interface adapter. An adapter must be connected before the printer is operational.The adapter types available are:

- RS232C Serial I/F Module, DB-25P.
- IEEE1284 Parallel I/F Module, AMP 57-40360
- Universal Serial Bus I/F Module, USB-B
- Ethernet 10/100BaseT I/F Module, RJ-45

Memory Card Slot: Two slots for optional PCMCIA Memory Cards.

EXT: External signal connector for Accessories, AMP 57-60140.

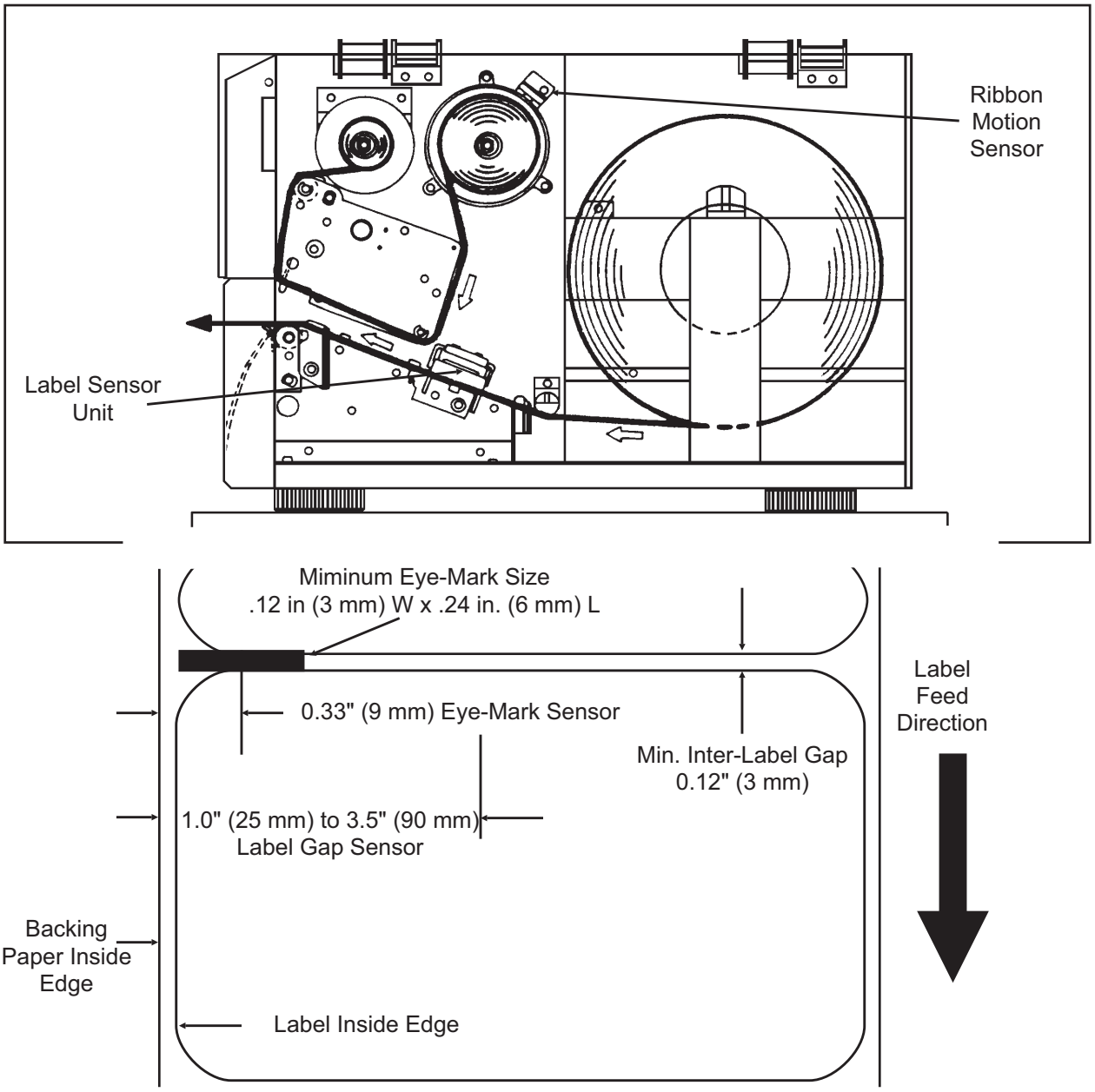


SWITCHES AND SENSORS — CL608e and CL612e

Ribbon End Sensor: This sensor is a motion detector that signals the printer when the ribbon supply is turning.

Head Open Switch: When the print head is opened, this switch is activated and the printer will stop printing.

Label Sensor Unit: This sensor unit contains two types of sensors, one for label gap and one for Eye-Mark sensing.



CL608e and CL612e Label Sensor Positioning

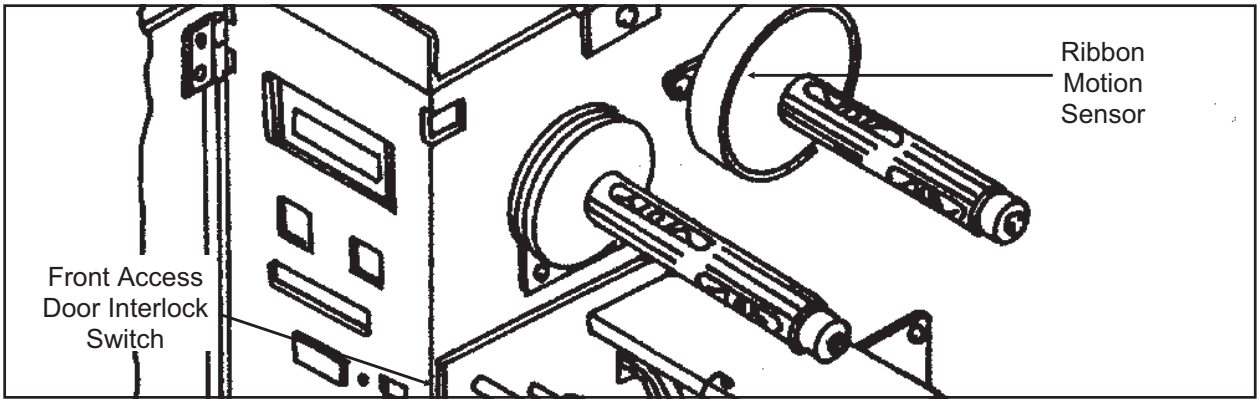
SWITCHES AND SENSORS — CL408e and CL412e

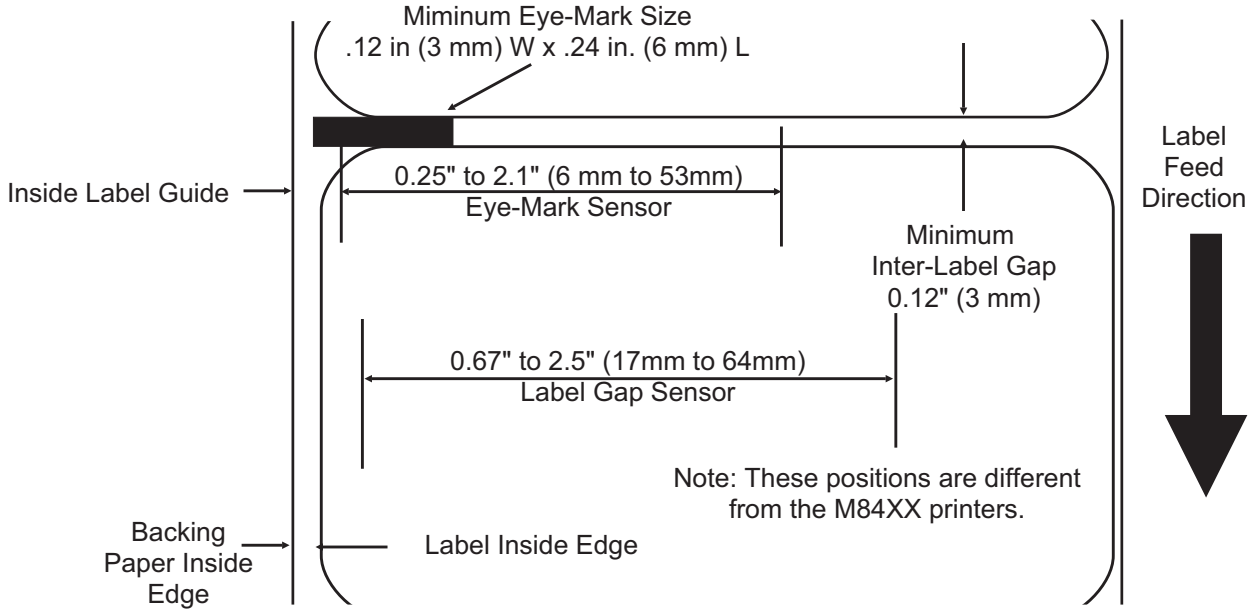
Ribbon End Sensor: This sensor is a motion detector that signals the printer when the ribbon supply is turning.

Head Open Switch: When the print head is opened, this switch is activated and the printer will stop printing.

Label Sensor Unit: This sensor unit contains two types of sensors, one for label gap and one for Eye-Mark sensing. The sensors are adjustable over a limited range.

Front Access Door Interlock: This switch prevents printer operation when the Front Access Door is open. The Top Access Door must be open before the Front Access Door can be opened or closed.





CL408e and CL412e Label Sensor Positioning

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SECTION 3.
CONFIGURATION

PRINTER DIP SWITCH CONFIGURATION

DIP Switch Panels

There are two DIP switches (DSW2 and DSW3) located inside the cover. These switches can be used to set:

- Thermal transfer or direct thermal mode
- Label sensor enable/disable
- Head check mode
- Hex dump mode
- Single Job or Multi-Job Receive buffer
- Operation mode

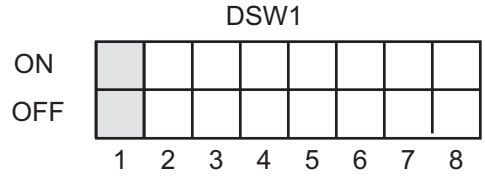
In addition, a third DIP switch is located on the RS232 Serial Adapter card and is used to set the RS232C transmit/receive parameters

Each switch is an eight section toggle switch. The ON position is always to the top. To set the switches, first power the unit Off, then position the DIP switches. Finally, after placing the switches in the desired positions, power the printer back on. The switch settings are read by the printer electronics during the power up sequence. They will not become effective until the power is cycled.

RS232 Transmit/Receive Setting (located on RS232 I/F Mudule)

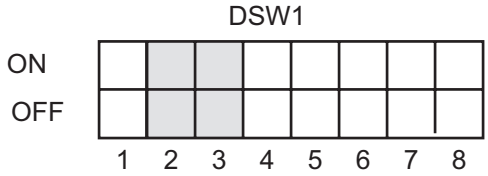
Data Bit Selection (DSW1-1). This switch sets the printer to receive either 7 or 8 bit data bits for each byte transmitted.

DSW1-1	SETTING
Off	8 data bits
On	7 data bits



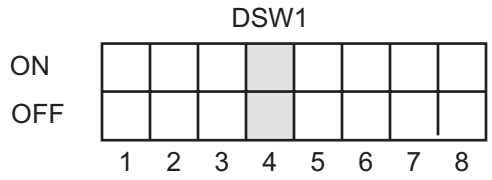
Parity Selection (DSW1-2, DSW1-3). These switches select the type of parity used for error detection.

DSW1-2	DSW1-3	SETTING
Off	Off	No Parity
Off	On	Even
On	Off	Odd
On	On	Not Used



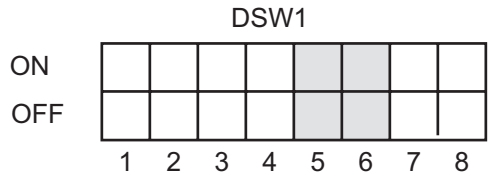
Stop Bit Selection (DSW1-4). Selects the number of stop bits to end each byte transmission.

DSW1-4	SETTING
Off	1 Stop Bit
On	2 Stop Bits



Baud Rate Selection (DSW1-5, DSW1-6). Selects the data rate (bps) for the RS232 port.

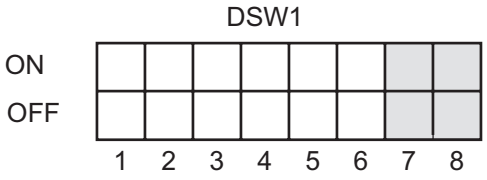
DSW1-5	DSW1-6	SETTING
Off	Off	9600
Off	On	19200
On	Off	38400
On	On	57600



Protocol Selection (DSW1-7, DSW1-8). Selects the flow control and status reporting protocols. See *Section 6: Interface Specifications* for more information.

(* Will select protocol for M-8400 if DSW2-8 is ON)

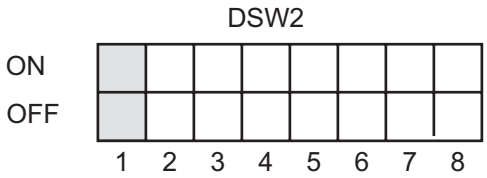
DSW1-7	DSW1-8	SETTING
Off	Off	Rdy/Bsy
Off	On	Xon/Xoff
On	Off	Bi-Com 3
On	On	Bi-Com 4*



Printer Set Up

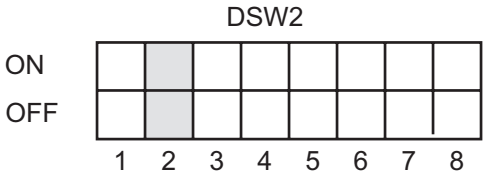
Print Mode Selection (DSW2-1). Selects between direct thermal printing on thermally sensitive paper and thermal transfer printing using a ribbon.

DSW2-1	SETTING
Off	Therm Xfr
On	Direct Therm



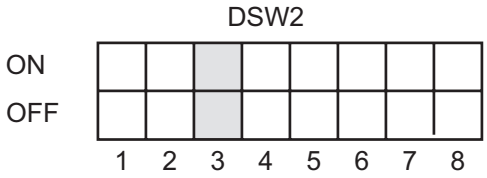
Sensor Type Selection (DSW2-2). Selects between the use of a label gap or a reflective Eye-Mark detector.

DSW2-2	SETTING
Off	Gap
On	Eye-Mark



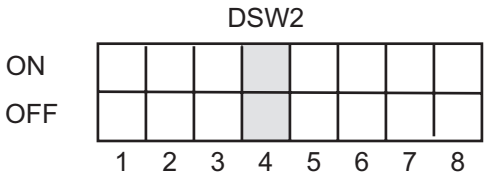
Head Check Selection (DSW2-3). When selected, the printer will check for head elements that are electrically malfunctioning.

DSW2-3	SETTING
Off	Disabled
On	Enabled



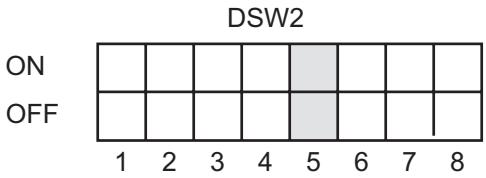
Hex Dump Selection (DSW2-4). Selects Hex Dump mode.

DSW2-4	SETTING
Off	Disabled
On	Enabled



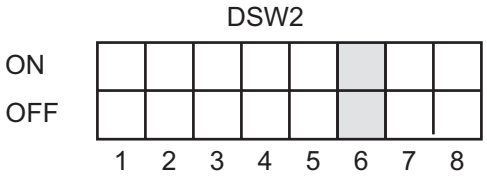
Receive Buffer Selection(DSW2-5). Selects the operating mode of the receive buffer. See *Section 6: Interface Specifications* for more information.

DSW2-5	SETTING
Off	Single Job
On	Multi Job



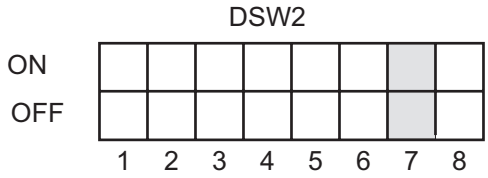
Firmware Download (DSW2-6). Places the printer in the Firmware Download mode for downloading new firmware into flash ROM.

DSW2-6	SETTING
Off	Disabled
On	Enabled



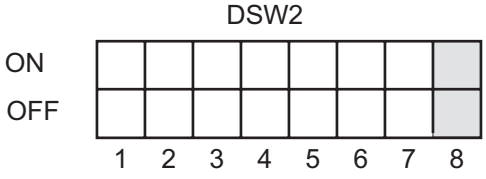
Protocol Code Selection (DSW2-7). Selects the command codes used for protocol control. Refer to Appendix E for more information.

DSW2-7	SETTING
Off	Standard
On	Non-Std



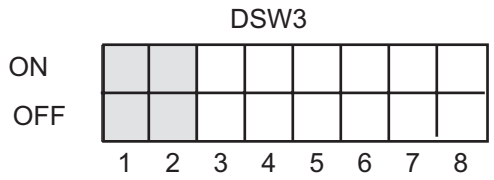
M8400S Emulation Mode (DSW2-8). For emulating earlier series software commands. Should be used only if problems are encountered when using existing software. This switch will also affect the settings selected by DSW1-7 and DSW1-8.

DSW2-8	SETTING
Off	Disabled
On	Enabled



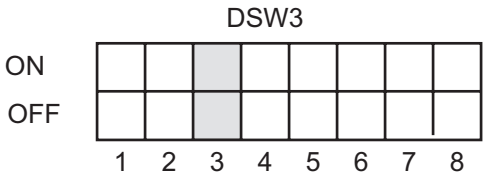
Backfeed Sequence (DSW3-1). Backfeed is used to correctly position the label for application and then retract the next label to the proper print position. This operation can be performed immediately after a label is printed and used, or immediately prior to the printing of the next label.

DSW3-1	DSW3-2	SETTING
Off	Off	Continuous
Off	On	Tear-Off
On	Off	Dispenser
On	On	Cutter



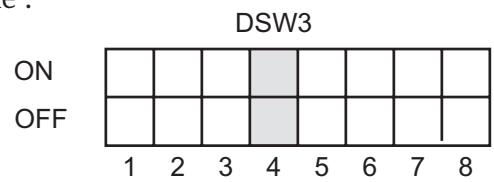
Label Sensor Selection (DSW3-3). Enables or disables the Label Sensor. If the Sensor is enabled, it will detect the edge of the label and position it automatically. If it is disabled, the positioning must be under software control using Line Feed commands.

DSW3-3	SETTING
Off	Sensor Used
On	Not Used



Back-Feed Selection (DSW3-4). When Back-Feed is enabled, the printer will position the last printed label for dispensing and retract it before printing the next label. The amount of backfeed offset is adjustable .

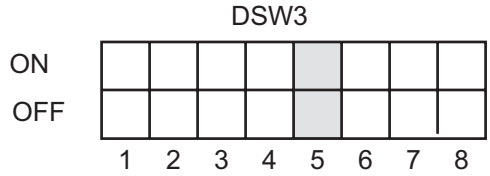
DSW3-4	SETTING
Off	Enabled
On	Disabled



External Signal Interface. See *Section 6: Interface Specifications* for information on the External Signals.

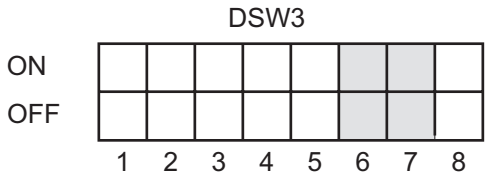
EXT Print Start Signal Selection (DSW3-5). Allows an external device to initiate a label print for synchronization with the applicator. See *Section 6: Interface Specifications* for a description of the signal level and requirements When DSW3-5 is Off, the External Signals are ignored.

DSW3-5	SETTING
Off	Disabled
On	Enabled



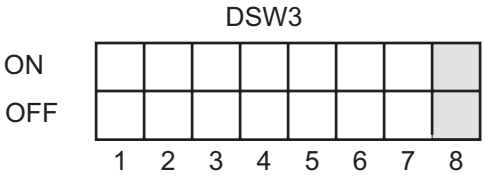
External Signal Type Selection (DSW3-6, DSW3-7). Both the polarity and signal type (level or pulse) of the external print synchronizing signal can be selected. See *Section 6: Interface Specifications* for a definition of signal types.

DSW3-6	DSW3-7	SETTING
Off	Off	Type 4
Off	On	Type 3
On	Off	Type 2
On	On	Type 1



Repeat Print via External Signal (DSW3-8). Allows the applicator to reprint the last label of the print job. See *Section 6: Interface Specifications* for a description of the signal requirements.

DSW3-8	SETTING
Off	Disabled
On	Enabled



DEFAULT SETTINGS

SWITCH SELECTIONS

All switches are placed in the Off default position for shipping. This will result in the following operating configuration:

Communications: 8 data bits, no parity, 1 Stop bit, 9600 Baud(1)
Protocol: Ready/Busy
Sensor: Gap Sensor
Receive Buffer: Multi Job
Mode: Batch/continuous
Label Sensor: Sensor Used
Backfeed: Disabled
External Signals: Disabled

(1) Only if RS232 I/F Module is installed.

SOFTWARE DEFAULT SETTINGS

The printer stores the software settings upon receipt and uses them until they are again changed by receipt of a command containing a new setting. These settings are stored in non-volatile memory and are not affected by powering the printer off. The printer may be reset to use the default software settings by depressing the LINE and FEED keys simultaneously while powering the printer on. You will be asked to confirm that you want the printer default settings by selecting either YES or NO by using the LINE key to step the underline cursor to the desired setting. If you select YES and press the FEED key, the following default configuration will be stored:

	CL408e	CL412e	CL608e	CL612e
Print Darkness	3		2	
Print Speed	4 in. per sec.		6 in. per sec.	
Print Reference	Vertical = 0000, Horizontal = 0000			
Zero	Slash			
Auto On Line	Enabled			

Once the default operation is completed, a DEFAULT COMPLETED message will be displayed on the LCD panel or a single beep will be heard if the printer does not have an LCD panel. The printer should be powered off while this message is being displayed (or after the beep is heard. This saves the default settings in the non-volatile memory where they will be automatically loaded the next time the printer is powered on.

POTENTIOMETER ADJUSTMENTS

PITCH

After the pitch has been set with the LCD Control Panel, it is sometimes desirable to make minor adjustments. This can be done using the **PITCH** potentiometer on the front panel. This potentiometer is set at the factory so that it has a range of +/- 3.75 mm. The midpoint setting should have no effect on the pitch. Turning the potentiometer all the way clockwise should move the print position 3.75 mm up towards the top edge of the label. Turning it all the way counterclockwise should move the print position down 3.75 mm.

1. While depressing the **FEED** key on the front panel, power the printer on.

2. When you hear one beep from the printer, release the **FEED** key and the printer will display on the LCD panel a message asking what type of Test Label you want to print.

3. Use the **LINE** key to step to the Configuration selection and press the **FEED** key to accept the selection.

4. Use the **LINE** key to select the Test Label Size. After the size is selected, press the **FEED** key to accept the selection and the printer will begin to print test labels continuously.

4. Adjust the **PITCH** potentiometer on the front panel until the first print position is at the desired location on the label. If the potentiometer does not have enough range, then you will have to change the pitch setting using the front panel display.

5. Press the **FEED** key to stop the printer.

6. To exit the Test Label mode, power the printer off andthen back on.

Adjusting the **PITCH** potentiometer will affect the stop position of the label.

BACKFEED OFFSET

When a label is printed it must be correctly positioned for dispensing and application. The Backfeed adjustment is used to position the label so that it is fully dispensed and ready for application. It may then be necessary to reposition the next label before printing. The Backfeed (repositioning of the label)operation is enabled if DSW3-4 is in the Off position. If Backfeed is enabled, placing DSW3-1 is in the Off position will cause the backfeed operation to be performed immediately before each label is printed. If DSW3-1 is in the On position, the backfeed operation is performed as soon as the dispensed label has been printed and taken from the printer.

The amount of backfeed is controlled by the **OFFSET** potentiometer on the DIP Switch Panel inside the cover. When turned all the way counterclockwise, the amount of backfeed is +3.75 mm, and -3.75 mm when turned all the way counterclockwise.

1. Turn the printer on.

2. Press the **LINE** key to place the printer in the Off Line status.

3. Press the **FEED** key to feed out a blank label.

4. Adjust the position using the **OFFSET** potentiometer on the front control panel and feed another label by depressing the **FEED** key. Repeat this procedure until the label is fully released from the liner.

DISPLAY

This potentiometer is used to adjust the contrast of the LCD display for optimum viewing under various lighting conditions.

PRINT

The PRINT potentiometer is used to adjust the amount of heat (i.e., power) applied to the head for printing. It provides a continuous range of adjustment. Maximum print darkness is obtained by turning the potentiometer all the way clockwise and a maximum counterclockwise setting will give the lightest print.

NOTE: The PRINT potentiometer adjustment will affect the darkness in all of the command code speed and darkness ranges.

LCD PANEL PRINTER CONFIGURATION

The LCD Panel is used by the operator in conjunction with the LINE and FEED switches to manually enter printer configuration settings. Many of these settings can also be controlled via software commands and in the case of conflict between software and control panel settings, the printer will always use the last valid setting. If you load a label job that includes software settings and then enter a new setting via the LCD panel, the manually set values will be used by the printer. If you set the values manually and then download a job with software settings, the software settings will be used.

There are nine modes of operation. To enter the desired mode, the KEY SEQUENCE combination listed in the table below must be performed. The initial LCD display message is shown for each mode.

MODE	KEY SEQUENCE	INITIAL DISPLAY	PAGE
Normal	POWER	**ONLINE QTY:000000**	3-
Advanced	LINE + POWER	**ADVANCED MODE**	3-
Test Print	FEED + POWER	**TEST PRINT MODE CONFIGURATION**	3-
Default Setting	LINE + FEED + POWER	**DEFAULT SETTING YES NO**	3-
Clear Non-Standard Protocol	DSW2-7 ON + LINE + FEED + POWER	**ALT. PROTOCOL**	3-
Protocol Code Download	DSW2-7 ON + POWER	**USER DOWNLOAD**	3-
Hex Dump	DSW2-4 ON + POWER	**ONLINE QTY:000000**	3-

NORMAL MODE

The printer initially powers on in the ONLINE mode. The user can access the User Settings using the following procedures.

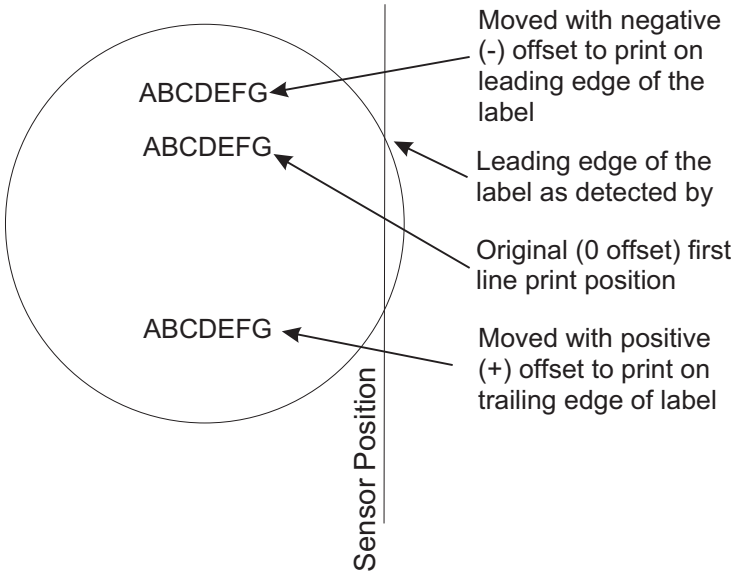
INITIALIZING **ROM V00.00.00.00**	Display lists the current ROM version of the printer during the initialization process.
ONLINE **QTY:000000**	The LCD will display the ONLINE status on the top line and the bottom line will contain the label quantity (QTY) status. The messsge will be changed to OFFLINE whenever the printer is switched offline by pressing the LINE key. As soon a print job is received, the quantily line will indicate the number of labels to be printed. As soon as the label job begins to print, the display will indicate the number of labels in the print job that remains to be printed.
OFFLINE **000000**	Press the LINE key once. When the display changes to OFFLINE, press the FEED and LINE keys simultaneously for more than one second.
PRINT DARKNESS **1 2 3 4 5**	The LCD now displays the Print Darkness selections. The current setting is indicated by an underline cursor under one of the range settings. 1. Press the LINE key to step the cursor to the desired setting. 2. Once the correct setting is underlined, press the FEED key to accept the selection and step the display to the next adjustment.
PRINT SPEED **4 6 8**	The print speed selections are dependent upon the printer model. The current setting is indicated by the underline cursor. 1. Use the LINE key to step the underline cursor to the desired setting. 2. Once the correct setting is underlined, press the FEED key to accept the selection and step the display to the next adjustment.

CL408e/CL412e	CL608e/CL612e
2 ips	4 ips
3 ips	6 ips
4 ips	8 ips
5 ips	
6 ips	

PITCH OFFSET
± 00mm

The label Pitch is the distance from the leading edge (the edge that comes out of the printer first) of a label and the leading edge of the next label. The leading edge position of the label can be adjusted relative to the print head +/- 49mm in increments of 1mm. Once the position is set, it can be fine adjusted +/- 3.75mm using the PITCH potentometer on the Adjustment Panel.

1. The underline cursor will initially be positioned underneath the Pitch Direction setting. Pressing the LINE key will step the setting to the positive (+) or negative (-) selection. A positive selection moves the leading edge of the label forward (away from the print head) while a negative selection moves the leading edge of the label back into the mechanism.
2. Once the correct direction is selected, pressing the FEED key will accept the setting and advance the cursor to the Offset selection.
3. Use the LINE key to step the first digit of the counter to the desired setting. The display will increment one step each timethe LINE key is pressed. The reading will advance to a setting of 4 after which it will automatically wrap and start at 0 again.
4. Press the FEED key to accept the setting and advance the cursor to the second digit. Again use the LINE key to step to the desired setting. Once it is correct, pressing the FEED key will step to the next adjustment.
   You may wish to print a test label after completing the adjustments to ensure they are correct.



CANCEL PRINT JOB YES NO

If the printer has a print job(s) in memory, selecting YES will cause the job(s) to be cleared. The default selection is NO. Be sure you want to cancel the print job(s) before selecting yes as the job(s) cannot be recovered and will have to be retransmitted tyo the printer.

1. Use the LINE key to step the underline cursor to either the YES or NO selection.
2. Once the correct setting is underlined, pressing the FEED key will accept the setting.

CANCEL PRINT JOB COMPLETED

3. After the print job(s) have been cleared from memory, the printer will display a COMPLETED message for 3 seconds and then return to the initial ONLINE Normal Mode.
4. If you wish to change any of the settings, you must enter the User Settings mode again by taking the printer OFFLINE and pressing the LINE and FEED keys.

ADVANCED MODE

An Advanced Mode is provided to make adjustments that require only occasional changes. Since they affect the basic operation of the printer, the procedure for entering this mode is designed to prevent someone from accidently changing the settings.

ADVANCED MODE

The Advance Mode is entered by pressing the LINE key while simultaneously turning power on. The printer will emit one long beep after which the LINE key is released. Pressing the FEED key will step the display to the first selection.

ZERO SLASH YES NO

This setting determines if a zero is printed with a slash or without a slash. This setting can also be controlled via software commands. When YES is selected, the printer internal fonts will have a slash through the center of the zero character.

1. Use the LINE key to step the underline cusor to either the YES or NO selection.
2. Once the correct setting is underlined, pressing the FEED key will accept the setting and advance the display to the Auto Online display.

AUTO ONLINE YES NO

This setting determines the mode in which the printer powers up. If the YES selection is made, the printer powers up in the ONLINE mode and is ready to print. If NO is selected, the printer powers up in the OFF LINE mode and must be manually placed in the ON LINE mode by pressing the LINE key before it is ready to print.

1. Use the LINE key to step the underline to either the YES or NO selection.
2. Once the correct setting is underlined, pressing the **FEED** key will accept the setting and advance the display to the Print Offset display.

PRINT OFFSET
V:+000 H:+000

Vertical Offset is the distance down from the leading edge (the edge of the label that comes out of the printer first) to the first vertical print position. A positive setting moves the first print position down the length of the label while making it negative moves it up the length of the label. Horizontal Offset is distance that the label image is shifted either to the right or left on the label. The image is shifted to the left (towards the inside edge of the label for a right-hand printer) for a positive setting and it is shifted to the right (towards the outside edge of the label) for a negative setting. This setting changes the base reference point for all subsequent label jobs. It's effect is identical to the <ESC>A3 Base Reference point command. Since the printer moves the label in discrete steps equal to the size of the print dot, the units of measure for Vertical and Horizontal Offset distance is dots. The maximum values that can be set for each is +/-800.

1. Use the LINE key to step the first digit of the counter to the desired setting. The display will increment one step each timethe LINE key is pressed.
2. Press the FEED key to accept the setting and advance the cursor to the second digit. Again use the LINE key to step to the desired setting. Once it is correct, pressing the FEED key will step to the next adjustment.
3. Once the setting is correct, pressing the FEED key will accept the setting and advance to the next display.

You may wish to print a test label after completing the adjustments to ensure they are correct.

Note: This setting can be overriden by the Base Reference Point Command.

SET CALENDAR
YES NO

The Calendar is an optional feature in all CL Series printers allowing the date and time to be set manually using the LCD Display or via the <ESC>WT Calendar Set command. The last setting, set either manually via software command, received by the printer will be the value used. The format of the display is YY/MM/DD hh:mm (Year/Month/Day/hours:minutes).The date format is fixed and cannot be changed.
To enable the Calendar feature (if installed), press the LINE key until the underline cursor is beneath the the YES. If the Calendar feature is to be disabled, press the LINE key until the cursor is underneath the NO. When the desired setting is selected, press the FEED key.

CALENDAR
00/00/00 00:00

1. Year - The first display shown will have the two digit year selection underlined. You can scroll through the dates by pressing the LINE key. The year number will increase by one each time the LINE key is pressed until it reaches its maximum legal value (i.e., “99” for the year digits) at which point it will wrap around to the “00” setting.
2. Month - After you have set the correct year, pressing the FEED key will advance the underline cursor to the two digit Month position. You can scroll through the numbers corresponding to the month by pressing the LINE key. The month number will increase by one each time the LINE key is pressed until it reaches a value of “12” at which point it will wrap around to the “01” setting.
3. Day - After you have set the correct month, pressing the FEED key will advance the underline cursor to the two digit Day position. You can scroll through the numbers corresponding to the month date by pressing the LINE key. The date number will increase by one each time the LINE key is pressed until it reaches a value of “31” at which point it will wrap around to the “01” setting.
4. Hour - After you have set the correct date, pressing the FEED key will advance the underline cursor to the two digit Hour position. You can scroll through the numbers corresponding to the hour (using a 24 hour clock) by pressing the LINE key. The hour number will increase by one each time the LINE key is pressed until it reaches a value of “24” at which point it will wrap around to the “01” setting.
5. Minute- After you have set the correct hour, pressing the FEED key will advance the underline cursor to the two digit Minute position. You can scroll through the numbers corresponding to the hour by pressing the LINE key. The minute number will increase by one each time the line key is pressed until it reaches a value of “60” at which point it will wrap around to the “01” setting.
6. After youhave set the minutes, pressing the FEED key will accept the setting and advance to the Ignore CR/LF selection.

IGNORE CR/LF
YES NO

This selection tells the printer to strip out all carriage return/line feed pairs (CRLF) from the data stream, including graphics and 2D bar codes. It is used primrily to maintain compatibility with earlier models of SATO printers.

1. Use the LINE key to step the underline cusor to either the YES or NO selection.
2. Once the correct setting is underlined, pressing the FEED key will accept the setting and advance the display to the Character Pitch display.

CHARACTER PITCH **FIXED PROP**	This selection allows you to set the default character pitch to either fixed character spacing or proportional character spacing. 1. Use the LINE key to step the underline cursor to the desired setting. 2. Once the correct setting is underlined, pressing the FEED key will accept the setting and the display will return to the Advanced Mode display. *Note: This command can be overriden by the <ESC>PR or <ESC>PS Character Pitch Commands.*
ADVANCED MODE	To exit the Advanced mode, power the printer off and then back on.

CARD MODE

The Card Mode allows the operator to manage the Expanded Memory (PCMCIA Card or Internal Expanded Flash ROM).

ADVANCED MODE	The Card Mode is entered from the Advanced Mode display by pressing the LINE key once.
CARD MODE	The Card Mode display indicates that the printer is in the Card Mode. To advance to the first selection, press the FEED key.
MEM SELECT (CC1) **CARD MEMORY**	This selection determines which type of optional expanded memory will be addressed as “CC1" in the command streams.The CARD selection specifies the optional PCMCIA card as CC1 and the optional Expanded Flash ROM as CC2. The Memory selection specifies the optional Expanded Flash ROM as CC1 and the optional PCMCIA card as CC2. 1. Step the underline cursor to the desired selection using the LINE key. 2. Once the underline cursor is positioned under the desired selection, press the FEED key to accept the selection and advance the display.
CARD->MEMORYCOPY **TRUETYPEFONT Y/N**	This selection allows you to copy TrueType fonts from the PCMCIA Memory card installed in the Memory Card slot on the rear of the printer to the optional Flash ROM. 1. Use the LINE key to step the cursor to desired setting. If Yes is selected, the printer will enter the Card Copy mode. If No is selected, the display will advance to the Card to Memory SATO Font Copy mode.
COPY START **YES NO**	2. Confirm your selection by stepping the underline cursor to the Yes selection. If you select No, the display will return to the previous selection.
TRUETYPEFONTCOPY **COPYING**	3. Press the FEED key to accept the selection. If Yes was selected the copy process will start.
TRUETYPE FONTCOPY **COMPLETED**	4. Once the copy process is completed, press the FEED key to step the display.

CARD COPY/FORMAT **XXXXXXX ERROR**

5. If an error is encountered in the copy process, one of the following messages will be displayed on the second line:

R/W Error	Indicates a Read/Write error occured
No Card Error	Indicates no card was recognized
Mem Full Error	Indicates that there is insufficient memory available.

CARD->MEMORYCOPY **SATOFONT Y/N**

This selection allows you to copy SATO fonts from the PCMCIA Memory card installed in the Memory Card slot on the rear of the printer to the optional Flash ROM.

1. Use the LINE key to step the cursor to desired setting. If Yes is selected, the printer will enter the Card Copy mode. If No is selected, the display will advance to the Card to Memory Copy All mode.

COPY START **YES NO**

2. Confirm your selection by stepping the underline cursor to the Yes selection. If you select No, the display will return to the previous selection.

SATO FONT COPY **COPYING**

3. Press the FEED key to accept the selection. If Yes was selected the copy process will start

SATO FONT COPY **COMPLETED**

4. Once the copy process is completed, press the FEED key to step the display.

CARD COPY/FORMAT **XXXXXXX ERROR**

5. If an error is encountered in the copy process, one of the following messages will be displayed on the second line:

R/W Error	Indicates a Read/Write error occured
No Card Error	Indicates no card was recognized
Mem Full Error	Indicates that there is insufficient memory available.

CARD->MEMORYCOPY **ALL Y/N**

This selection allows you to copy the entire contents from the PCMCIA Memory card installed in the Memory Card slot on the rear of the printer to the optional internal Expanded Memory.

1. Use the LINE key to step the cursor to desired setting. If Yes is selected, the printer will enter the Card Copy mode. If No is selected, the display will advance to the Card to Memory Copy All mode.

COPY START **YES NO**

2. Confirm your selection by stepping the underline cursor to the Yes selection. If you select No, the display will return to the previous selection.

CARD->MEMORY **COPYING**

3. Press the FEED key to accept the selection. If Yes was selected the copy process will start

CARD-.MEMORY **COMPLETED**

4. Once the copy process is completed, press the FEED key to step the display.

CARD COPY/FORMAT **XXXXXXX ERROR**

5. If an error is encountered in the copy process, one of the following messages will be displayed on the second line:

R/W Error	Indicates a Read/Write error occured
No Card Error	Indicates no card was recognized
Mem Full Error	Indicates that there is insufficient memory available.

MEMORY->CARDCOPY
ALL <XMB> Y/N

This selection allows you to copy the entire contents of the optional Expanded Memory to the PCMCIA Memory card installed in the Memory Card slot on the rear of the printer.

1. Use the LINE key to step the cursor to desired setting. If Yes is selected, the printer will enter the Card Copy mode. If No is selected, the display will advance to the Card to Memory Copy All mode.

COPY START
YES NO

2. Confirm your selection by stepping the underline cursor to the Yes selection. If you select No, the display will return to the previous selection.

MEMORY->CARD COPY
COPYING

3. Press the FEED key to accept the selection. If Yes was selected the copy process will start

MEMORY->CARD COPY
COMPLETED

4. Once the copy process is completed, press the FEED key to step the display.

CARD COPY/FORMAT
XXXXXXX ERROR

5. If an error is encountered in the copy process, one of the following messages will be displayed on the second line:

R/W Error	Indicates a Read/Write error occured
No Card Error	Indicates no card was recognized
Mem Full Error	Indicates that there is insufficient memory available.

CARD->MEMORYCOPY
PROGRAM Y/N

This selection allows the user to copy printer firmware from the PCMCIA Memory Card to the printer.

1. Use the LINE key to step the cursor to desired setting. If Yes is selected, the printer will enter the Card Copy mode. If No is selected, the display will advance to the mode display.

COPY START
YES NO

2. Confirm your selection by stepping the underline cursor to the Yes selection. If you select No, the display will return to the previous selection.

CARD->MEMORY COPY
COPYING

3. Press the FEED key to accept the selection. If Yes was selected the copy process will start

CARD->MEMORYCOPY
COMPLETED

4. Once the copy process is completed, press the FEED key to step the display.

CARD COPY/FORMAT
XXXXXXX ERROR

5. If an error is encountered in the copy process, one of the following messages will be displayed on the second line:

R/W Error	Indicates a Read/Write error occured
No Card Error	Indicates no card was recognized
Mem Full Error	Indicates that there is insufficient memory available.

MEMORY->CARDCOPY
PROGRAM Y/N

This selection allows the user to copy the current firmware installed in the printer to a PCMCIA Memory Card.

1. Use the LINE key to step the cursor to desired setting. If Yes is selected, the printer will enter the Card Copy mode. If No is selected, the display will advance to the mode display.

COPY START **YES NO**

2. Press the FEED key to accept the selection. If Yes was selected the copy process will start. If you select No, the display will return to the previous selection.

MEMORY->CARDCOPY **COMPLETED**

3. Once the copy process is completed, press the FEED key to step the display.

CARD COPY/FORMAT **XXXXXXX ERROR**

4. If an error is encountered in the copy process, one of the following messages will be displayed on the second line:

R/W Error	Indicates a Read/Write error occured
No Card Error	Indicates no card was recognized
Mem Full Error	Indicates that there is insufficient memory available.

CARD FORMAT **YES NO**

Before a PCMCIA card can be used, it must be formatted.
Note: Formatting a card destroys all data currently stored on the card.

1. Use the LINE key to step the cursor to desired setting. If Yes is selected, the printer will enter the Card Format mode. If No is selected, the display will advance to the mode display.

MEMORY FORMAT **YES NO**

Before the internal Expanded Memory can be used, it must be formatted.
Note: Formatting the Memory will destroy any stored data.

1. Use the LINE key to step the cursor to desired setting. If Yes is selected, the printer will enter the Memory Format mode. If No is selected, the display will advance to the mode display.

CARD MODE

To exit the Card Mode, power the printer off and then back on.

SERVICE MODE

The Service Mode allows the operator to set up the basic operation parameters of the printer.

ADVANCED MODE

The Service Mode is entered from the Advanced Mode display by pressing the LINE key twice.

SERVICE MODE

The Service Mode display indicates that the printer is in the Card Mode. To advance to the first selection, press the FEED key.

GAP	**[X.XV]**
INPUT	**[X.XV]**

The “Se” Series printers determine the location of the leading edge of the label by measuring the difference between light levels when it sees either a label edge or a black “EYE” mark. This adjustment allows you to manually set the threshold voltage level, between the maximum and minimum light levels. DIP switch DSW2-2 selects the sensor type. If DSW2-2 is in the OFF position, the setting will be for a See-Thru (or Gap) sensor and the LCD will display “GAP” on the top line along with the current setting. If DSW2-2 is in the ON position, the LCD will display “EYE” on the top line with its current setting. If the value entered for the bottom line setting is “0.0V”, then the printer will automatically calculate the setting when the first label is fed after the printer is powered on or the head is closed. There are some instances where the automatically calculated value must be adjusted to ensure reliable label feeding, such as when the backing opacity or the reflectance of the EYE mark varies significantly within a roll of labels or between label rolls. In these instances the value should be set using the following procedures.

GAP	**[X.XV]**
INPUT	**[X.XV]**

GAP - When setting the “gap” threshold, the voltage shown on the top line of the display must be measured with nothing but the backing in the sensor and then again with a label still attached to the backing. The formula to be used for setting the threshold is:

(High Voltage Level + Low Voltage Level) x 0.5 = Start Value

1. Insert a label still attached to the backing into the sensor and close the Label Hold-Down. Record the voltage shown on the top line of the LCD panel. This line should have the message “GAP” on the top line (DIP switch DSW2-2 = OFF). Make sure the label is all the way under the sensor.
2. Strip the label from the backing and insert the backing strip under the sensor and close the Label Lid. Record the voltage shown on the top line of the LCD panel. The voltage ranges measured should be within the following range

   Backing without label = 0.5V or less
   Backing with label = 1.0V ≥ the low value

   If the measured values are outside this range, you may have trouble in finding a value that will work properly under all conditions. If this is the case, a higher quality label may be needed to get adequate performance.
3. Calculate the starting point voltage using the formula.
4. Use the LINE key to step the counter to the desired setting. The display will increment one step for each time the LINE key is pressed. If the LINE key is held pressed for more than two seconds, it will automatically go into the fast scroll mode. The reading will advance to a setting of 3.3 (the maximum voltage) after which it will automatically wrap and start at “0.0” again. If a value of “0.0” is set,the printer will automatically set the level each time the printer is powered on with labels loaded or the head is closed.
5. Once the setting is correct, pressing the FEED key will accept the setting and advance to the Online Feed display.

EYE [X.XV]
INPUT [X.XV]

EYE - When setting the “eye” threshold, the voltage must be measured with nothing but the label under the sensor and then again withthe printed “eye” mark under the sensor. The formula for this is:

(High Voltage Level + Low Voltage Level) x 0.5 = Start Value

1. Insert a label into the sensor and close the Label Hold-Down. Make sure the printed “eye” mark is *not* under the sensor. Record the voltage shown on the top line of the LCD panel. This line should have the message “EYE” on the top line (DIP switch DSW2-2 = ON).
2. Now pull the label forward until the “eye” mark is positioned under the sensor (the voltage reading should be at its highest point). Record the voltage shown on the top line of the LCD panel. The voltage ranges measured should be within the following ranges:

   Label Only = 0.3 to 0.7V

   Eye-Mark ≥ 1.2V above low value

   If the measured values are outside this range, you may have trouble in finding a value that will work properly under all conditions. If this is the case, a higher quality label may be needed to get adequate performance.
3. Calculate the starting point voltage using the formula.
4. Use the LINE key to step the counter to the desired setting. The display will increment one step for each time the LINE key is pressed. If the LINE key is held pressed for more than two seconds, it will automatically go into the fast scroll mode. The reading will advance to a setting of 3.3 (the maximum voltage) after which it will automatically wrap and start at “0.0” again. If a value of “0.0” is set, the printer will automatically set the level each time the printer is powered on with labels loaded or the head is closed.
5. Once the setting is correct, pressing the FEED key will accept the setting and advance to the Online Feed display.

ONLINE FEED
YES NO

This selection specifies whether or not the printer will automatically feed a blank label when it is placed in the Online mode.

1. Use the LINE key to step the cursor to desired setting. If Yes is selected, the printer will feed a blank label anytime it enters the Online mode. If No is selected, the display will advance to the mode display.

FEED ON ERROR
YES NO

This selection specifies whether or not the printer will feed a blank label automatically when an error condition is cleared..

1. Use the LINE key to step the cursor to desired setting. If Yes is selected, the printer will feed a blank label anytime an error condition is cleared. If No is selected, the display will advance to the mode display.

REPRINT W/FEED
YES NO

This selection specifies whether or not the printer will print the last printed label stored in memory when the FEED key is pressed in the Normal Online mode.

1. Use the LINE key to step the cursor to desired setting. If Yes is selected, the printer will reprint the last label when the FEED key is pressed when the printer is Online. If the printer is Offline, pressing the FEED key will feed a blank label. If No is selected, the display will advance to the mode display.

FORWARD/BACKFEED
DISTANCE DEFAULT

This dsiplay will only appear when Backfeed is enabled (DSW3-4 = OFF). The maximum backfeed distance is 255 mm.

1. Use the LINE key to select either the Default or the Distance selection. If Default is selected, the display steps to the Web acceleration selection.

FORWARD/BACKFEED
DISTANCE XXXmm

2. If Manual setting is selected, use the LINE key to advance the distance to the desired setting. Each time the LINE key is pressed, the Distance will advance 1 mm. The maximum distance is 255 mm.
3. Once the desired distance is set, press the FEED key to accept the setting and step to the next display.

EURO CODE
D5

This selection allows the user to specify the hexadecimal code for the character which is replaced with the Euro Character. The default is $D5_H$.

1. The underline cursor should be positioned underneath the first digit selection. Use the LINE key to step to the desired setting.
2. Press the FEED key to advance the underlline cursor to the second digit of the desired hexacecimal code.
3. Press the LINE key to step to the desired setting.
4. When the setting is correct, press the FEED key to accept the setting and step to the next display.

SELECT LANGUAGE
ENGLISH

This selection allows the user to select the character set used by the printer. The selections are English, French, German, Spanish, Italian and Portuguese.

1. Press the LINE key to advance to the desired languarge setting.
2. When the setting is correct, press the FEED key to accept the setting and step to the next display.

PRIORITY SETTING
LCD COMMAND

This selection allows the user to assign a priority for Print Darkenss, Print Speed and Print Offset.

1. Use the LINE key to step to the desired priority. If LCD is selected, the setting established via the LCD display/menu system will be used for an incoming label job, regardless of any different command settings. If Command is selected, any commands in the label job will take precedence and be used for printing the job and the LCD Display will reflect the new setting.

2. Once the desired setting is selected, press the FEED key to accept the setting and step to the next display.

SERVICE MODE

The Service mode is exited by powering the printer off and then back on.

COUNTER MODE

The Counter Mode is provided to allow the user to access the internal printer cousters.

ADVANCED MODE

The Counter Mode is accessed from the Advanced Mode. Press the LINE key to step to the Counter Mode.

COUNTER MODE

Pressing the FEED key will advance the display to the counter selections.

SELECT COUNTER **HD DSP CUT LIFE**

The counters are identified in the display as:

- HD: Head Counter (should be reset when print head is replaced)
- DSP: Dispense Counter
- CUT: Cutter Counter
- LIFE: Life Counter (cannot be reset)

1. Use the LINE key to step the underline cursor to the desired counter, the Head (HD) counter or the LIFE counter. The default position is the Head Counter. Use the LINE key to advance the underline cursor to the desired selection.

HEAD COUNTER **XXXXX M**

2. Pressing the FEED key again will advance the counter to the Clear mode. All counters with the exception of the LIFE counter may be cleared.
3. Once the correct setting is underlined, pressing the FEED key will display the current value (in meters)stored in the counter.

HD CNTR CLEAR **YES NO**

4. Use the LINE key to select the desired setting. If you only wanted to read the counter value, select NO. If you want to read the counter and reset it to 0.0, place the underline cursor under the YES. Once the desired setting is selected, pressing the FEED key will advance the return you to the Counters Mode display.

COUNTERS MODE

5. To exit the Counters Mode, turn power to the printer off and then back on.

TEST PRINT MODE

The Test Print Mode offers five different printer status labels for troubleshooting. If DSW3-5 is On, the Test Print cycle must be initiated with a Print Start command.

TEST PRINT MODE
CONFIGURATION

This option allows you to print a test label. It is recommended that you print a test label after you have changed any of the settings in the Advanced Mode. The test label allows you to verify that you indeed did make the desired changes. To enter the User Test Print Mode, power the printer on while pressing the **FEED** key. The printer will beep. Release the **FEED** key and the printer will display the Test Print Mode message on the LCD panel:

1. Use the **LINE** key to step the underline cursor to type of test label you wish to print. The choices are:

   Configuration
   Bar Code
   Head Pattern
   Memory
   Factory

TEST PRINT SIZE
10 CM

Once you have selected the type of test label to be printed, use the FEED key to accept the selection and the display advances to the Test Print Size display. This display allows you to select the label width.

1. Use the LINE key to select the label width. Each time the LINE key is pressed, the label size advances 1 cm until it reaches a maximum width of 10 cm, at which point it will wrap to the smallest size of 4 cm.

PRESS FEED KEY
TO STOP PRINTING

2. Pressing the LINE key accepts the selection.
3. Press the FEED key to start printing test labels continuously.
4. Press the FEED key to stop the printer.
5. To exit the Test Print Mode, power the printer off and then back on.

DEFAULT SETTING MODE

Occassionally it is desirable to reset all printer configuration settings to their original default conditions. This allows the operator to start reconfiguration of the printer starting from a know set of conditions.

DEFAULT SETTING
YES NO

You enter the Default Setting Mode by pressing the LINE and FEED keys while simultaneously powering the printer on. The printer will emit one long beep after which the FEED and LINE keys should be released.

1. Use LINE key to select either the YES or number
2. Once the desired setting is selected, pressing the FEED key will accept the selection and the printer will reset to the original default conditions.

DEFAULT SETTING
COMPLETED

3. When the printer has completed the reset process, the Default Setting Completed display will appear. At this time the printer is in the default configuration.
4. To exit the Default Setting Mode, power the printer off and then back on.

CLEAR NON-STANDARD PROTOCOL

The standard protocol codes used by the printer can be modified to accomodate the requirements of different host systems. However, if the printer is to be used with a system that does not use the custom protocol codes, they can be cleared and the default protocol codes reactivated. The default values are: STX = $7B_H$, ETX = $7D_H$, ESC = $5E_H$, ENQ = 40_H, NULL = $7E_H$, CAN = 21_H and OFFLINE = $5D_H$.

ALT.PROTOCOL
DEFAULT COMPLETE

To Clear Non-Standard protocol codes, DSW2-7 is placed in the on position and the printer powered on while simultaneously pressing the LINE and FEED keys.

1. The printer will emit one long beep at which time the LINE and FEED keys should be released.
2. When the keys are released, the printer will replace the Alternate protocol codes with the default values.
3. After the default setting is complete, the printer will emit two short beeps indicating the process is complete.
4. To exit the mode, power the printer off and then back on.

DOWNLOAD USER DEFINED PROTOCOL CODES

The user can define a set of custom protocol codes and download them to the printer using the <ESC>LD command.

USER DOWNLOAD
PRESS THE LINE KEY

To enter the User Download mode, DSW2-7 is placed in the on position and the printer is powered on while simultaneously pressing the LINE key. The printer will emit one long beep after which the LINE key is released.

1. Set DSW2-7 off to replace the Standard protocold codes or on to replace the Alternate set of protocol codes.

USER DOWNLOAD
WAITING

1. Press the LINE key. The printer is now waiting for the data to be sent.
2. Transmit the download data command stream to the printer.
3. After the data has been received, the printer will beep and print a status label. If it does not beep and print a status label, the printer did not accept the data.
4. If the printer did not beep and print a status label, turn the printer off and check your data stream for errors and start the download process over.
5. If the custom codes are correct, press the FEED key to accept them and terminate the download process. If they are incorrect, turn the printer off without pressing the FEED key and begin the process again.

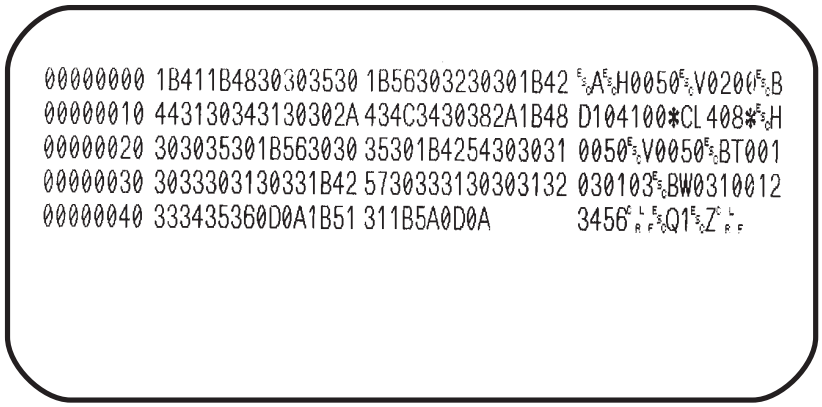
HEX DUMP MODE

In addition to the User Test Print Labels, the printer can print the contents of the receive buffer in a hexadecimal format to allow the data stream to be examined for errors and troubleshooting.

ONLINE
QTY:000000

The Hex Dump Mode is entered by placing DSW2-4 in the on position and powering the printer on.

1. The printer is now ready to receive data.
2. Send the data stream to the printer.
3. The received data will be printed in a hexadecimal format
4. To return the printer to normal operation, place DSW2-4 in the off position and power the printer off and then back on.



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SECTION 4.
CLEANING AND MAINTENANCE

INTRODUCTION

This section provides information on user maintenance for the CL Series “e” printers. Because they come in two versions that differ mechanically, it is divided into two basic sections, one covering the procedures for the CL6XXe and the other the procedures for the CL4XXe. Each section contains the following information.

- Adjusting the Print Quality
- Cleaning the Print Head, Platen and Rollers
- Replacing the Print Head
- Replacing the Fuse

PROCEDURES ALL MODELS

ADJUSTING THE PRINT QUALITY

The CL Series “e” printers are equipped with two different methods of adjusting the quality of the print; print darkness and speed. When adjusting the printer for optimum print quality, a bar code verifier system should be used. The human eye is a poor judge of the relative widths of the bars in a symbol, a characteristic that is extremely important for good bar code quality.

Darkness (Print)

This adjustment allows the user to control (within a specified range) the amount of power that is used to activate the individual print head heat elements. It is important to find a proper print darkness level based on your particular label and ribbon combination. The printed images should not be too light nor should the ink from the ribbon “bleed.” The edges of each image should be crisp and well defined.

The Print Darkness range can be set using the front panel LCD panel or by downloading the setting using the Print Darkness software command. The darkness ranges for the printer are displayed on the LCD panel. The lightest print is represented by the smaller value and the darkest print by the highest value. Once the range has been selected, the **PRINT** Potentiometer on the front panel can be used to make finer adjustments.

Print

The fine adjustment for Print Darkness is the **PRINT** potentiometer on the operator panel. It provides a continuous range of adjustment, allowing you to make precise changes. Use a small cross-point screwdriver, turning clockwise for darker print and counterclockwise for lighter print. See *Section 3:Configuration* for instructions on performing potentiometer adjustments

*NOTE: The **PRINT** potentiometer adjustment will affect the darkness in all of the command code speed ranges, i.e. if the **PRINT** potentiometer is adjusted for lighter print, the darkness will be lighter in all speed ranges selected by the command code.*

Print Speed

The other method of controlling print quality is by controlling the speed at which the label is printed. This adjustment is made only on an individual label basis using either the Print Speed command code or the LCD display panel. For more details on this command, see *Section 5: Programming*. Changing the print speed allows the user to control the amount of time allowed for print element cooling before the media is stepped to the next print position. It is especially critical when printing "ladder" bar codes (bar codes printed with the bars parallel to the print line). When printing a "ladder" bar code, it is important to allow the head to cool sufficiently before stepping to the next position. If it does not have sufficient time to cool, the bar will be "smeared" on the trailing edge.

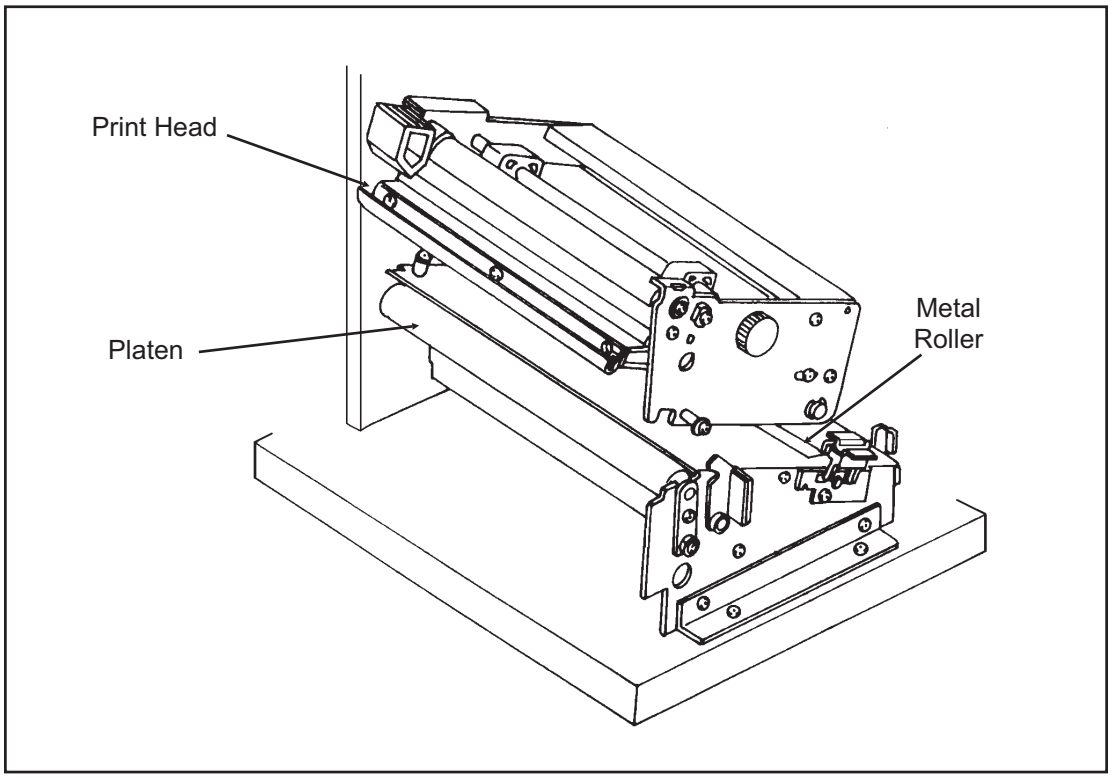
The Print Speed can be set using the LCD panel or with the Print Speed command code. The software command will override the any setting entered using the LCD panel.

CLEANING THE PRINT HEAD, PLATEN AND ROLLERS CL608e and CL612e

Supplies needed: SATO SA070 Cleaning Kit

Cleaning the Print Head

1. Turn the printer off and remove the power cable.
2. Open the **Label Access** door.
3. Open the **Print Head Assembly** by pushing the **Head Latch** toward the rear of the printer. The **Print Head Assembly** is spring-loaded and will automatically open as soon as the **Head Latch** is disengaged. Remove the ribbon.
4. Apply SATO Thermal Print Head Cleaner to a cotton swab.
5. The **Print Head** faces downward along the front edge of the assembly. Pass the end of the dampened swab along the entire width of the **Print Head** (you may need to move the ribbon out of the way to do this).
5. Check for any black coloring or adhesive on the swab after cleaning.
6. Repeat if necessary until the swab is clean after it is passed over the head.



7. The head should be cleaned at least every time the ribbon is changed and more often in harsh environments.

Cleaning the Platen and Rollers

1. Turn the printer off and remove the power cord.

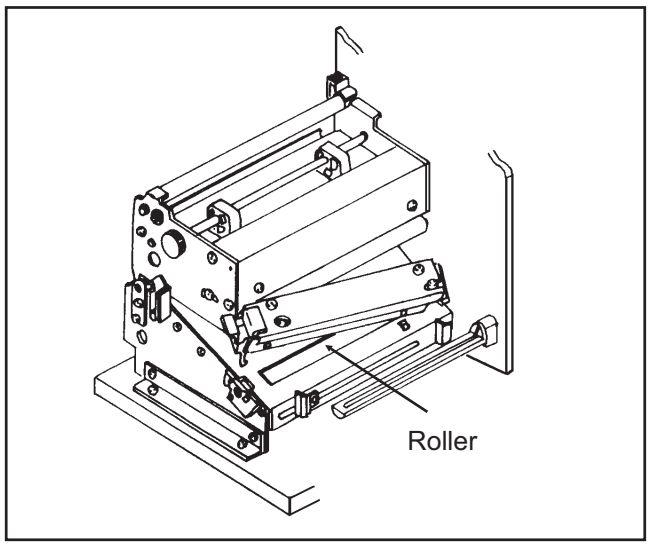
2. Open the **Label Access Door**.

3. Open the **Print Head Assembly** by pushing the **Head Latch** toward the rear of the printer. The **Print Head Assembly** is spring-loaded and will automatically open as soon as the **Head Latch** is disengaged. Remove the labels.

4. Apply SATO Thermal Print Head Cleaner to one of the cotton swabs.

5. The **Platen** is the rubber roller directly below the **Print Head**. It should be cleaned of any ribbon or label residue.

6. The **Label Load Roller** is located underneath the **Label Hold-Down**. It should be cleaned of any label residue or foreign material.



7. There is one metal roller used in guiding the labels through the printer. It should be cleaned of any residue or foreign material.

8. Repeat if necessary. The platen and rollers should be cleaned whenever foreign matter such as dust or adhesive is present.

REPLACING THE PRINT HEAD — CL608e and CL612e

The print head on the CL6XXe printers is a user-replaceable item. If it becomes damaged for any reason, it can be easily removed and replaced. Contact your local SATO representative for information on obtaining a new print head.

Supplies needed: No. 2 Phillips screwdriver (a magnetic tip is helpful)

1. Turn the printer off and remove the power cable.

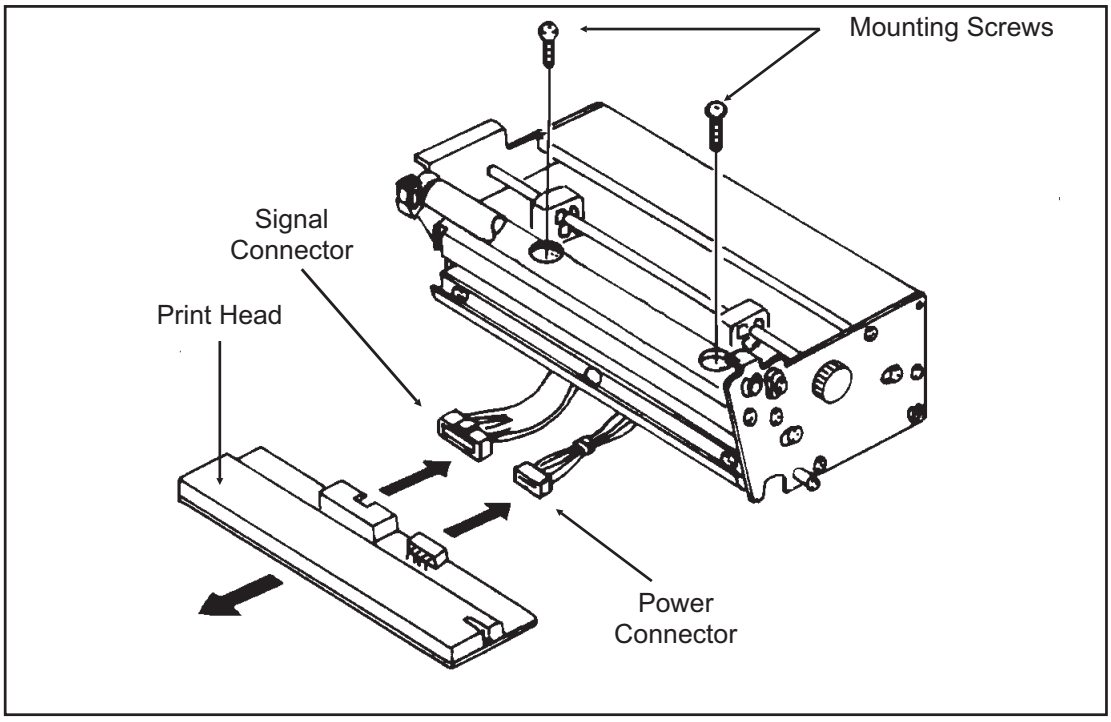
2. Open the **Label Access** door.

3. Open the **Print Head Assembly** by pushing the **Head Latch** toward the rear of the printer. The **Print Head Assembly** is spring-loaded and will automatically open as soon as the **Head Latch** is disengaged.

4. Remove the ribbon from the **Ribbon Rewind Spindle** if necessary.

5. View the **Print Head Assembly** from the front of the printer. Locate the two mounting screws on the top of the assembly. They are accessible through the two holes in the **Top Assembly Plate**. Unscrew these two screws and set them aside.

6. The **Print Head** should now be loosened from the top of the assembly by grasping either side and carefully pulling it forward.



7. Disconnect the signal and power cables from the print head connectors and set the **Print Head** aside.

8. Carefully attach the new print head to the connectors, using caution to make sure the connector keys are correctly positioned.

NOTE: Be careful not to scratch the printing surface of the print head while installing it. Scratching the surface will cause permanent and irreparable damage and is not covered by the warranty!

9. Locate the two mounting screws in the top plate assembly and align them with the tapped holes in the new print head.

10. Re-secure the print head by tightening the screws.

CLEANING THE SENSORS — CL608e and CL612e

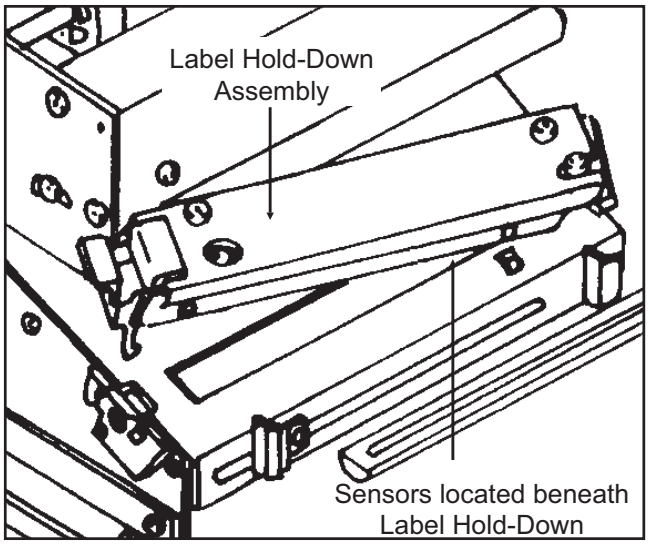
There are two sensors that are used to control the positioning of the label. One is a transmissive see-thru sensor that detects the edge of the label by looking through the backing paper which is translucent and detecting the presence of the opaque label. The other is a reflective sensor that detects the light reflected from the bottom of the label liner. When a printed black Eye-Mark passes through the beam, the light is no longer reflected back to the sensor detector, indicating to the printer that it should use this position as the start of a new label. When dust, dirt or other foreign matter interferes with the light path of either of these sensors, the results is erratic label positioning. These sensors should be cleaned regularly, at least every two rolls of labels.

Supplies Needed: **SATO SA070 Cleaning Kit**

1. Turn the printer off and remove the power cable.

2. Open the **Label Access Door**.

3. Open the **Label Hold-Down** by disengaging the latch. The **Label Hold-Down** is spring loaded and will stay in the up position. Two rectangular holes will be visible underneath the **Label Hold-Down** when it is raised. These are located approximately 1 and 2 inches in from the printer side plate.



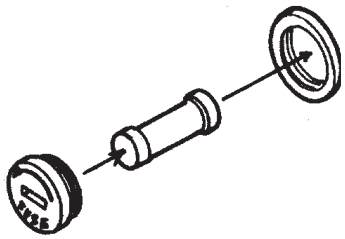
4. Apply SATO Thermal Print Head Cleaner to one of the cotton swabs.

5. Use the cotton swab to clean any foreign matter from the exposed surface of the sensors.

REPLACING THE FUSE — CL608e and CL612e

Supplies needed: 250V 3A Fuse

1. Turn the printer power off and remove the power cable.
2. On the back of the printer, locate the **Fuse Cap** directly above the AC connector.
3. Unscrew the cap and remove the defective fuse.
4. Replace with a new 250V 3A fuse.
5. Screw the cap back onto the printer and replace the power cord.



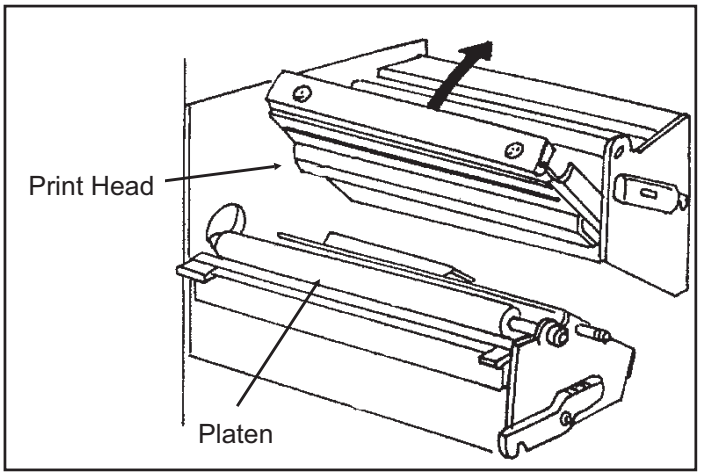
CLEANING THE PRINT HEAD AND PLATEN — CL408e and CL412e

Supplies needed: SATO SA070 Cleaning Kit

Cleaning the Print Head

1. Turn the printer off and remove the power cable and open the **Top Access Door.**

2. Open the **Print Head Assembly** by rotating the green **Head Latch** counter-clockwise. The **Print Head Assembly** is spring-loaded and will automatically open as soon as the **Head Latch** is disengaged. Remove the ribbon.



3. Apply SATO Thermal Print Head Cleaner to a cotton swab.

4. The **Print Head** faces downward along the front edge of the assembly. Pass the end of the dampened swab along the entire width of the **Print Head** (you may need to move the ribbon out of the way to do this).

5. Check for any black coloring or adhesive on the swab after cleaning.

6. Repeat if necessary until the swab is clean after it is passed over the head.

7. The head should be cleaned at least every time the ribbon is changed and more often in harsh environments.

Cleaning the Platen

1. Turn the printer off and remove the power cord.

2. Open the **Print Head Assembly** by rotating the green **Head Latch** counter-clockwise. The **Print Head Assembly** is spring-loaded and will automatically open as soon as the **Head Latch** is disengaged. Remove the labels.

3. Apply SATO Thermal Print Head Cleaner to one of the cotton swabs.

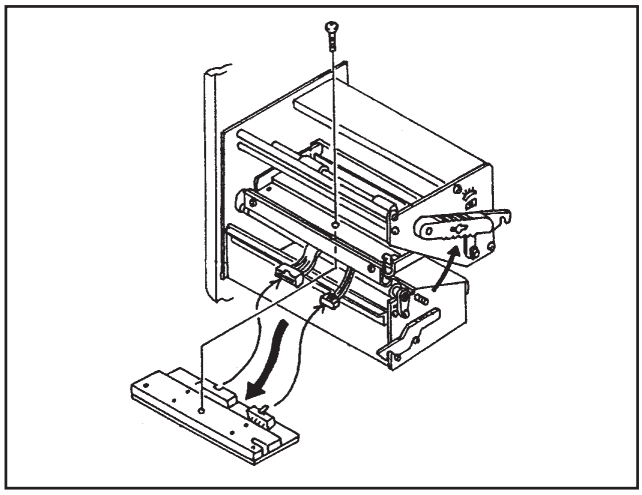
4. The **Platen** is the rubber roller directly below the **Print Head**. It should be cleaned of any ribbon or label residue.

5. Repeat if necessary. The platen and rollers should be cleaned whenever foreign matter such as dust or adhesive is present.

REPLACING THE PRINT HEAD — CL408e and CL412e

The print head on the CL4XXe printers is a user-replaceable item. If it becomes damaged for any reason, it can be easily removed and replaced. Contact your local SATO representative for information on obtaining a new print head.

Supplies needed: No. 2 Phillips screwdriver (a magnetic tip is helpful)



1. Turn the printer off and remove the power cable and open the **Top Access Door**.
2. Open the **Print Head Assembly** by rotating the green **Head Latch** counter-clockwise. The **Print Head Assembly** is spring-loaded and will automatically open as soon as the **Head Latch** is disengaged.
3. Remove the ribbon from the **Ribbon Rewind Spindle** if necessary.
4. View the **Print Head Assembly** from the front of the printer. Locate the single mounting screw on the top of the assembly. It is accessible through the hole in the **Top Assembly Plate**. Unscrew the screw and set it aside.
5. The **Print Head** should now be loosened from the top of the assembly by grasping either side and carefully pulling it forward.
6. Disconnect the signal and power cables from the print head connectors and set the **Print Head** aside.
7. Carefully attach the new print head to the connectors, using caution to make sure the connector keys are correctly positioned.

   NOTE: Be careful not to scratch the printing surface of the print head while installing it. Scratching the surface will cause permanent and irreparable damage and is not covered by the warranty!

8. Locate the mounting screw in the top plate assembly and align it with the tapped hole in the new print head.

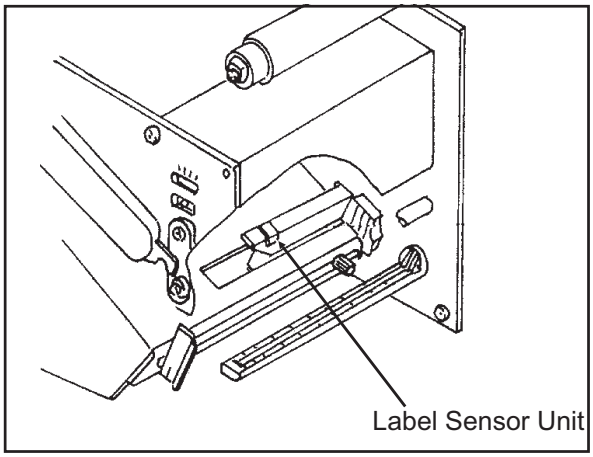
10. Re-secure the print head by tightening the screw.

CLEANING THE SENSORS — CL408e and CL412e

There are two sensors that are used to control the positioning of the label. One is a transmissive see-thru sensor that detects the edge of the label by looking through the backing paper which is translucent and detecting the presence of the opaque label. The other is a reflective sensor that detects the light reflected from the bottom of the label liner. When a printed black Eye-Mark passes through the beam, the light is no longer reflected back to the sensor detector, indicating to the printer that it should use this position as the start of a new label. When dust, dirt or other foreign matter interferes with the light path of either of these sensors, the results is erratic label positioning. These sensors should be cleaned regularly, at least every two rolls of labels.

Supplies Needed: SATO SA070 Cleaning Kit

1. Turn the printer off and remove the power cable.
2. Open the label **Top Access Door**.
3. Open the **Print Head Assembly** by rotating the green **Head Latch** counter-clockwise. The **Print Head Assembly** is spring-loaded and will automatically open as soon as the **Head Latch** is disengaged.

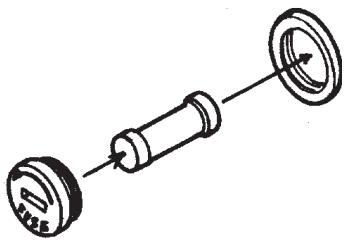


4. Apply SATO Thermal Print Head Cleaner to one of the cotton swabs.
5. Insert the cotton swab between the top and bottom pieces of the **Sensor Unit** and move back and forth to clean any foreign matter from the exposed surface of the sensors.

REPLACING THE FUSE — CL408e and CL412e

Supplies needed: 250V 3A Fuse

1. Turn the printer power off and remove the power cable..
2. On the back of the printer, locate the **Fuse Cap** directly above the AC connector.
3. Unscrew the cap and remove the defective fuse.
4. Replace with a new 250V 3A fuse.
5. Screw the cap back onto the printer and replace the power cord.



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SECTION 5.
PROGRAMMING

INTRODUCTION

This section presents the commands that are used with the SATO CL Series "e" printers to produce labels with logos, bar codes and alphanumeric data. All of the CL commands use the same syntax. Some commands reference a physical point on the label using horizontal and vertical dot reference numbers. The allowable range for these references is dependent upon the particular printer to accomodate different print widths and resolutions. These differences are noted in tables under the commands affected.

The following information is presented in this section:

- The SATO CL Programming Language
- Selecting Protocol Control Codes
- Using Basic
- The Print Area
- Command Codes

THE SATO CL PROGRAMMING LANGUAGE

A programming language for a printer is a familiar concept to most programmers. It is a group of commands that are designed to use the internal intelligence of the printer. The commands, which are referred to as CL Command Codes, contain non-printable ASCII characters (such as **<STX>**, **<ETX>**, **<ESC>**) and printable characters. These commands must be assembled into an organized block of code to be sent as one data stream to the printer, which in turn interprets the command codes and generates the desired label output. The programmer is free to use any programming language available to send the desired data to the SATO CL Series "e" printer.

The command codes used by the SATO CL Series "e" Printers are based upon "Escape" (1B hexadecimal) sequences. Typically there are four types of command sequences:

<ESC>{Command}

These commands generally tell the printer to perform a specific action, like "clear the memory."

<ESC>{Command} {Data}

Commands with this format tell the printer to perform a specific action which is dependent upon the following data, like "print X labels", where the value for X is contained in the data.

<ESC>{Command} {Parameter}

These commands set the operational parameters of the printer, like “set the print speed to 3.”

<ESC> {Command} {Parameter} {Data}

Some commands can contain both Parameter and Data elements, such as “print a Code 39 symbol containing the data”.

SELECTING PROTOCOL CONTROL CODES

Protocol codes are the special control characters that prepare the printer to receive instructions. For example, the **<ESC>** character tells the printer that a command code will follow and the **<ENQ>** character asks for the printer status.

There are two pre-defined different sets of Protocol Control codes to choose from. Each set is made up of six special characters. The Standard Protocol Control codes are non-printable characters, and the Non-Standard Protocol Control codes are printable characters. The Non-Standard set may be useful on host computers using protocol converters or in an application where non-printable ASCII characters cannot be sent from the host. This manual uses the Standard Protocol Control codes for all of the examples. Alternately, the user may define and download a set of custom Protocol Control Codes (see Appendix E).

The Protocol Control codes are selected by a DIP switch DSW2-7 on the front panel.

CONTROL CHARACTER	STANDARD DSW2-7 OFF	NON-STANDARD DSW2-7 ON	DESCRIPTION
STX	02 Hex	7B Hex = {	Start of Data
ETX	03 Hex	7D Hex = }	End of Data
ESC	1B Hex	5E Hex = ^	Command code to follow
NULL	00 Hex	7E Hex = ~	Cutter command
ENQ	05 Hex	40 Hex = @	Get printer status, Bi-Com mode
CAN	18 Hex	21 Hex = !	Cancel print job, Bi-Com mode
Off-Line	40 Hex	5D Hex =]	Take printer Off-Line

USING BASIC

It may be useful to test your CL printer using a BASIC program on a PC. You may also write your actual production programs in BASIC. Whatever the reason, if you will be working in BASIC, some of the following hints may help you get started:

1. Set the WIDTH of the output device to 255 characters to avoid automatically sending **<CR>** and **<LF>** characters after every line. The command string should be continuous and uninterrupted by **<CR>** and/or **<LF>** commands. The examples given in this manual are printed on separate lines because they will not fit on one line and do not contain any **<CR>** and/or **<LF>** characters. If these characters are needed, they are explicitly noted by the inclusion of **<CR>** and **<LF>** notations.

2. If you are using the printer's RS232 interface, it is necessary to set the COM port on the PC such that the CTS and DSR signals will be ignored. Send your OPEN "COM" statement in the following way:

   OPEN "COM1:9600,E,8,1,CS,DS" AS #1

   This sets the RS232 communication parameters of the host PC's COM1 port for 9600 baud, Even parity, 8 Data bits, 1 Stop bit and directing the port to ignore the **CTS** and **DSR** control signals.

3. You may want to minimize keystrokes and program size by assigning the **<ESC>** character to a string variable since this character is used quite often.

The following two examples in BASIC show a typical example using these hints. Both of these examples use the Standard Protocol codes.

Printing with the Parallel Port

5	REM CL612 Parallel Example	Identifies the program as a CL612 parallel port print label. The "REM" prevents this data from being sent to the printer and displays it only on the screen.
10	E$=CHR$(27)	Sets the "E$" string as an <ESC> character
20	WIDTH "LPT1:",255	Sets the width of the output to 255 characters
30	LPRINT E$;"A";	Sends an "<ESC>A" command code to the LPT1 parallel port
40	LPRINT E$;"H400";E$;"V100";E$;"XL1SATO";	Sends the data "SATO" to be to be placed 400 dots horizontally and 100 dots vertically on the label and printed in the "XL" font.
50	LPRINT E$;"Q1";	Instructs the printer to print one label.
60	LPRINT E$; "Z";	Tells the printer that the last command has been sent. The printer can now create and print the job.

Printing with the RS232 Port

5	REM CL612 RS232 Example	Identifies the program as a CL612 RS232 port print label. The "REM" prevents this data from being sent to the printer and displays it only on the screen.
10	E$=CHR$(27)	Sets the "E$" string as an <ESC> character.
20	OPEN "COM1:9600,N,8,1,CS,DS" AS #1	Opens the COM1 port for output and sets the parameters as 9600 baud, No parity, 8 Data bits, 1 Stop bit and instructs the port to ignore the CTS and DSR control signals.
30	PRINT #1,CHR$ (2);	Sends an <STX> (ASCII Code a decimal "2") to the printer instructing it to prepare to receive a message.

50 PRINT #1,E$;"A";	Sends an “<ESC>A” command code to Print Port #1 opened by statement 20 above.
60 PRINT #1, E$;"H400";E$;"V100";E$;"XL1SATO";	Sends the data “SATO” to be placed 400 dots horizontally and 100 dots vertically on the label and printed in the “XL” autosmoothed font.
50 PRINT #1, E$;"Q1";	Instructs the printer to print a quantity of one label.
60 PRINT #1, E$; “Z”;	Tells the printer that the last command has been sent. The printer can now create and print the job.
70 PRINT #1,CHR$ (3);	Sends an <ETX> (ASCII Code decimal “3”) to the printer telling it that this is the end of the message.

THE PRINT AREA

The maximum print area for the various CL Series “e” printers is listed in Table 5.1. Most of your label applications will not require labels that fill the entire print area, therefore it is important to understand how to work with labels that do not use the entire print area. The goal is to help you avoid printing where no label exists, which may lead to print head damage, not to mention frustration when you cannot see the printed output.

The diagram below illustrates the maximum print area and a sample 2 inch wide by 3 inch long label placed within this area. As can be seen, your label will be oriented against the inside left edge of the printer as viewed from the front of the printer. The normal reference point is located at the H1, V1 position of the print area in the normal print orientation (no rotation).

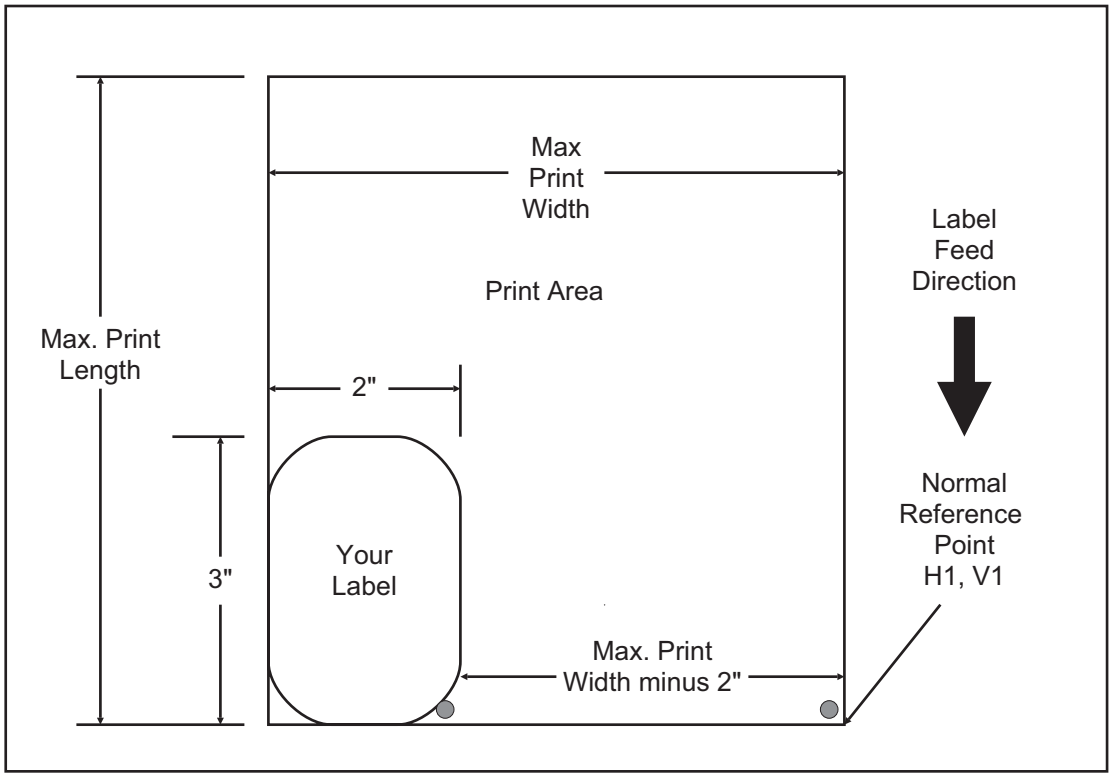


Table 5.1, Print Area

	CL408e	CL412e	CL608e	CL612e
Resolution	203 dpi 8 dpmm	305 dpi 12 dpmm	203 dpi 8 dpmm	305 dpi 12 dpmm
Max Print Width	832 dots 4.1 in. 104 mm	1248 dots 4.1 in. 104 mm	1216 dots 6.0 in. 152 mm	1984 dots 6.5 in. 165 mm
Max Label Width	5.0 in. 128 mm	5.0 in. 128 mm	7.0 in. 178 mm	7.0 in. 178 mm
Std Print Length	1424 dots 7.0 in. 178 mm	2136 dots 7.0 in. 178 mm	1424 dots 7.0 in. 178 mm	2136 dots 7.0 in. 178 mm
Expanded Print Length using <ESC>EX0 command	9999 dots (1) 49.2 in. 1249 mm	9999 dots (1) 32.8 in. 1249 mm	9999 dots (1) 49.2 in. 1249 mm	9999 dots (1) 32.8 in. 833 mm
(1). Limited by number of digits in command field.				

There are three methods available to make sure your printed output will appear correctly on your label. They are as follows:

1. **Media Size Command.** Use the <ESC>A1 Media Size Command. This command specifies the width and length of the label. The printer will automatically calculate the correct offsets for printing labels of that size. However, if you specify a label size with this command, the labels loaded should match the size specified to correctly position the label.

2. **Base Reference Point Command**. Send the <ESC> A3 Base Reference Point command as part of your data to the printer to set a new base reference point for your label.

   Calculate the distance (in dots) from the normal base reference point to the closest edge of the label. For a 12 dpmm printer (a CL412e or CL612e), this would be:

   Label Width = 2" x 25.4 mm/in x 12 dpmm = 610 dots

   For an 8 dpmm printer (a CL408e or CL608e), this would be:

   Label Width = 2" x 25.4 mm/in x 8 dpmm = 406 dots

   The new Base Reference Point then becomes:

   New Base Reference Point = Maximum Print Width - Label Width

For a CL612e the new Base Reference Point is:

New Base Reference Point = 1984 dots minus 610 dots = 1374 dots

Issue the Base Reference Point command <ESC>A3 after the Start command in your data stream.

<ESC>A<ESC>A3H**1374**V0001. . . . . .

This resets the reference point for all the following data.

3. **Add the correct offset to all horizontal commands**. Use the normal base reference point from the print area and use the horizontal position for each field to properly locate it on the label.

   Calculate the distance (in dots) from the normal base reference point to the closest edge of the label.

   For a 12 dpmm printer, this would be:

   Label Width = 2" x 25.4 mm/in x 12 dpmm = 610 dots

   and for an 8 dpmm printer:

   Label Width = 2" x 25.4 mm/in x 8 dpmm = 406 dots

   New Base Reference Point = Maximum Print Width - Label Width

   For a CL612e printer, this becomes:

   New Base Reference Point = 1984 dots - 610 dots = 1374 dots

   Each **<ESC>H** command would have the value “1374” added to it to correctly position each field.

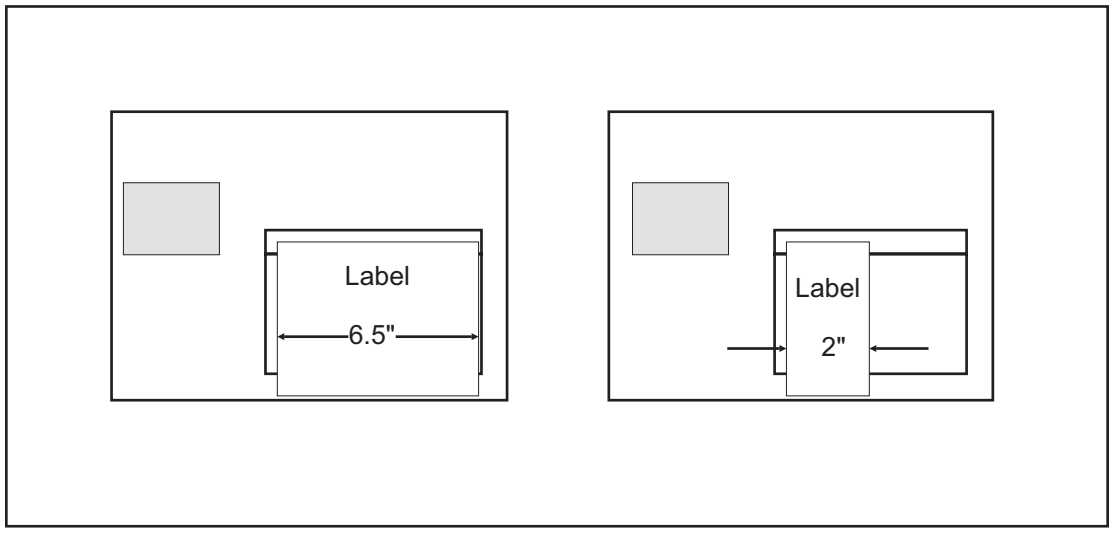
Note: The <ESC>A3 Base Reference Point command can also shift the reference point in a negative direction (toward the outside edge of the label).

The Command Code subsection contains a sample label output for each command code. These samples reflect how the printed information would appear on a five inch wide label. If you want to test any of the sample label outputs and are using labels less than five inches in width, we suggest that you add the Base Reference Point command to the data stream in order for the images to print on your labels.

You must be careful not to print off the label surface as the label provides a heat sink for the print head elements. Doing so will cause irreparable damage to the head. This damage is not covered under the print head warranty. The addition of the Base Reference Point command to the sample data stream may help to adjust the print for your labels. See the following two examples or refer to the Base Reference Point command description.

For example, the following illustrates a sample data stream for a CL612e printer and the resulting label assuming a 6.5 inch wide label:

```
<ESC>A
<ESC>H0050<ESC>V0100<ESC>L0303<ESC>XMSATO
<ESC>H0050<ESC>V0200<ESC>B103100*SATO*
<ESC>H0070<ESC>V0310<ESC>L0101<ESC>XUSATO
```

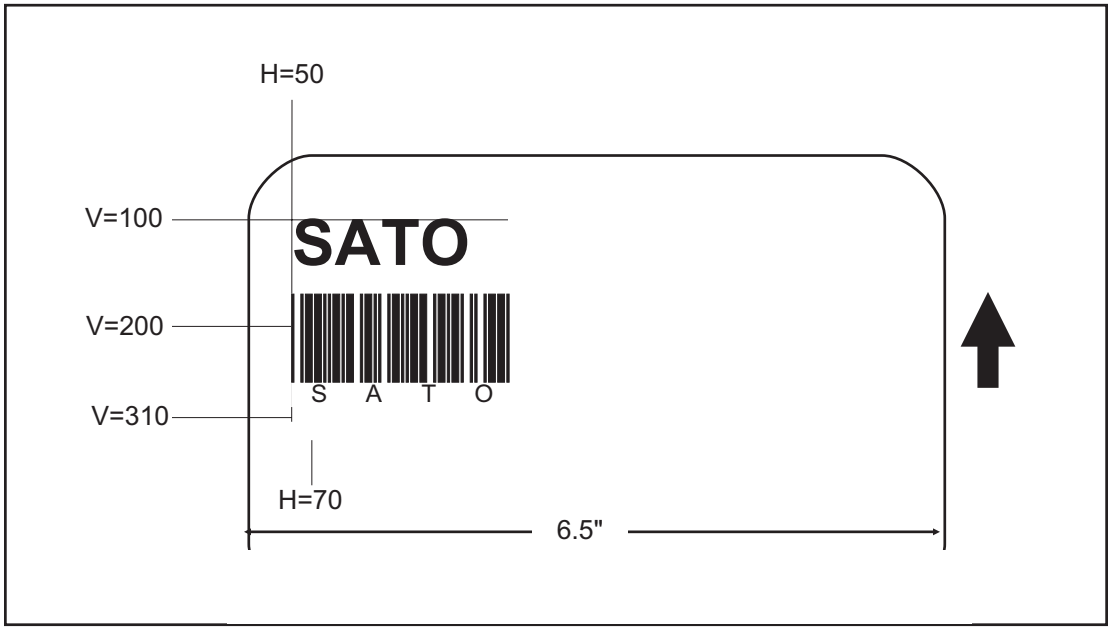


<ESC>Q1
<ESC>Z

If you are using a 2 inch wide label, the entire image may not appear on your label. By adding the following Base Reference Point command to the second line of the data stream, the base reference point will be changed, causing the image to be shifted over toward the inside of the printer where it can be printed on the narrower label.

<ESC>A
<ESC>**A3H1374V0001**
<ESC>H0050<ESC>V0100<ESC>L0303<ESC>XMSATO
<ESC>H0050<ESC>V0200<ESC>B103100*SATO*
<ESC>H0170<ESC>V0310<ESC>L0101<ESC>XUSATO
<ESC>Q1
<ESC>Z

The image is moved horizontally to the right 4.5 inches (1374 dots) so that it can be printed on a 2 inch wide label.



For more information, see the Base Reference Point command description.

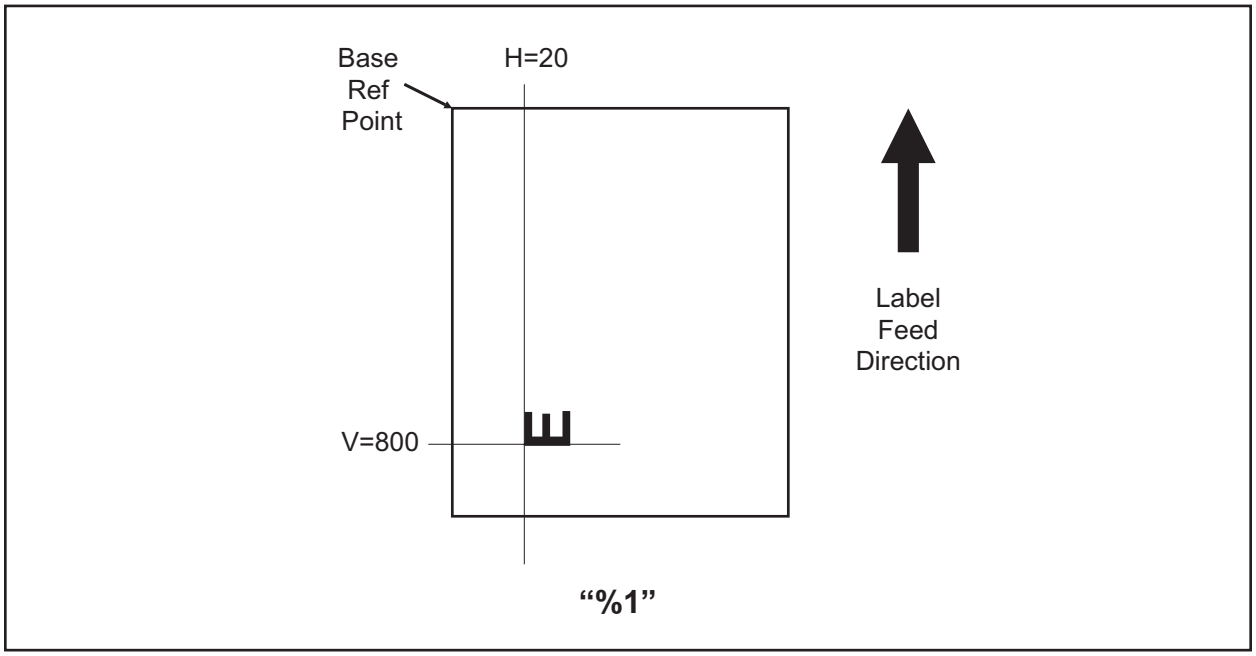
ROTATED FIELDS

The CL Series “e” printers can rotate each print field in 90° increments using the Rotate command.

- <ESC>% - The field rotates, but the base reference point for the field remains the same.

The following data stream will rotate the print field but will not change the base reference point of the field:

<ESC>A**<ESC>%1**<ESC>V800<ESC>H200<ESC>L0202<ESC>XB1E<ESC>Q1<ESC>Z



COMMAND DEFAULT SETTINGS

There are some types of commands that must have a value specified before a label can be printed. If the data stream does not contain these commands, a "default" value is assumed. The commands and the corresponding default values are:

COMMAND	DEFAULT	NOTE
Print Rotation	0°	(1)
Vertical Reference Point	0	(1)
Horizontal Reference Point	0	(1)
Character Pitch	2	(1)
Base Reference Point	H=0, V=0	(2)
Character Expansion	1	(1)
Print Darkness	2	(1)
Print Speed CL6XX	6 ips	(2)
Print Speed CL4XX	4 ips	(2)
Proportional Spacing	Enabled	(1)
Cutter Command	Disabled	(1)

NOTES:

(1) The settings for these commands will revert to the default value when the printer receives an **<ESC>Z** or an **<ESC>***.

(2) The values transmitted with these commands will remain in effect until a new command is received.

COMMAND CODES

This section contains all the CL Series “e” printer Command Codes. The commands must be sent to the printer in an organized fashion in order for the label(s) to print.

The purpose of this section is to:

1. Explain the different commands and provide examples of their usage.
2. To provide a detailed reference for programming the CL Series “e” Printers.

Each command begins on a separate page with its own heading. A uniform layout is used to help you find key information about each command. For each Command Code in this section, there will be a sample data input stream to the printer and the expected print output. By studying the examples, you can learn how to use the particular command within a whole block of printer code. Pay particular attention to the “Special Notes” with each command to learn other important information.

The subject commands are highlighted in bold letters in the Reference Sheets. There are two parts of most, but not all, commands. The first is the command character which immediately follows the **<ESC>** code. It is always an upper case alpha or a special character (such as an “&” or a “%”). It is never a lower case alpha character. If the command requires additional variable information, it is represented by a group of lower case alpha characters immediately following the command character. For example, if an **aaaabb** is listed following the basic command, the printer will look for six characters immediately following the command. The first four would represent the value of **aaaa** and the next two the value of **bb**.

The maximum number of characters defined in a parameter is represented by the number of characters shown in the command structure. For example, a command followed by an **aaaa** can have up to four characters. In general, commands with only one parameter following the command can be entered without the leading zeroes. However, certain commands require the exact number of matching characters. A command with two parameters listed following the command code without a comma delimiter, such as **aaaabbbb** require the exact number of digits to be entered. If the value of **aaaa** is “800” and the value of **bbbb** is “300”, then the parameters must be entered as “08000300”. It is recommended that you make it a practice to always enter leading zeros to prevent any mistakes.

NOTE: These examples assume the use of the Standard Protocol Command Codes, a parallel interface and a 5 inch wide label in a CL408e printer. The labels for all other printers will be similar, but, because of different resolutions and print widths may be larger or scaled differently.

An alphabetical listing of the command codes is contained in Appendix A: Command Code Quick Reference.

Bar Codes

Command Structure

1:3 narrow/wide bar ratio: <ESC>**Babbcccd**
2:5 narrow/wide ratio: <ESC>**BDabbcccd**
1:2 narrow/wide bar ratio: <ESC>**Dabbcccd**

a = Bar Code Symbol
- 0 Codabar
- 1 Code 39
- 2 Interleaved 2 of 5 (I 2/5)
- 3 UPC-A / EAN-13
- 4 EAN-8
- 5 Industrial 2 of 5
- 6 Matrix 2 of 5
- 7 reserved
- 8 reserved
- 9 reserved
- A MSI
- B reserved
- C Code 93
- D reserved
- E UPC-E
- F Bookland
- G Code 128
- I UCC 128

bb = Number of dots (01-12) for narrow bar and narrow space

ccc = Bar height in dots (001-600)

d = UCC 128 only. Not used for other bar code types
- 0 No human readable text
- 1 Human readable at top
- 2 Human readable at bottom

Example: <ESC>**BD103200**

Placement: Immediately preceding data to be encoded

Default: None

Command Function

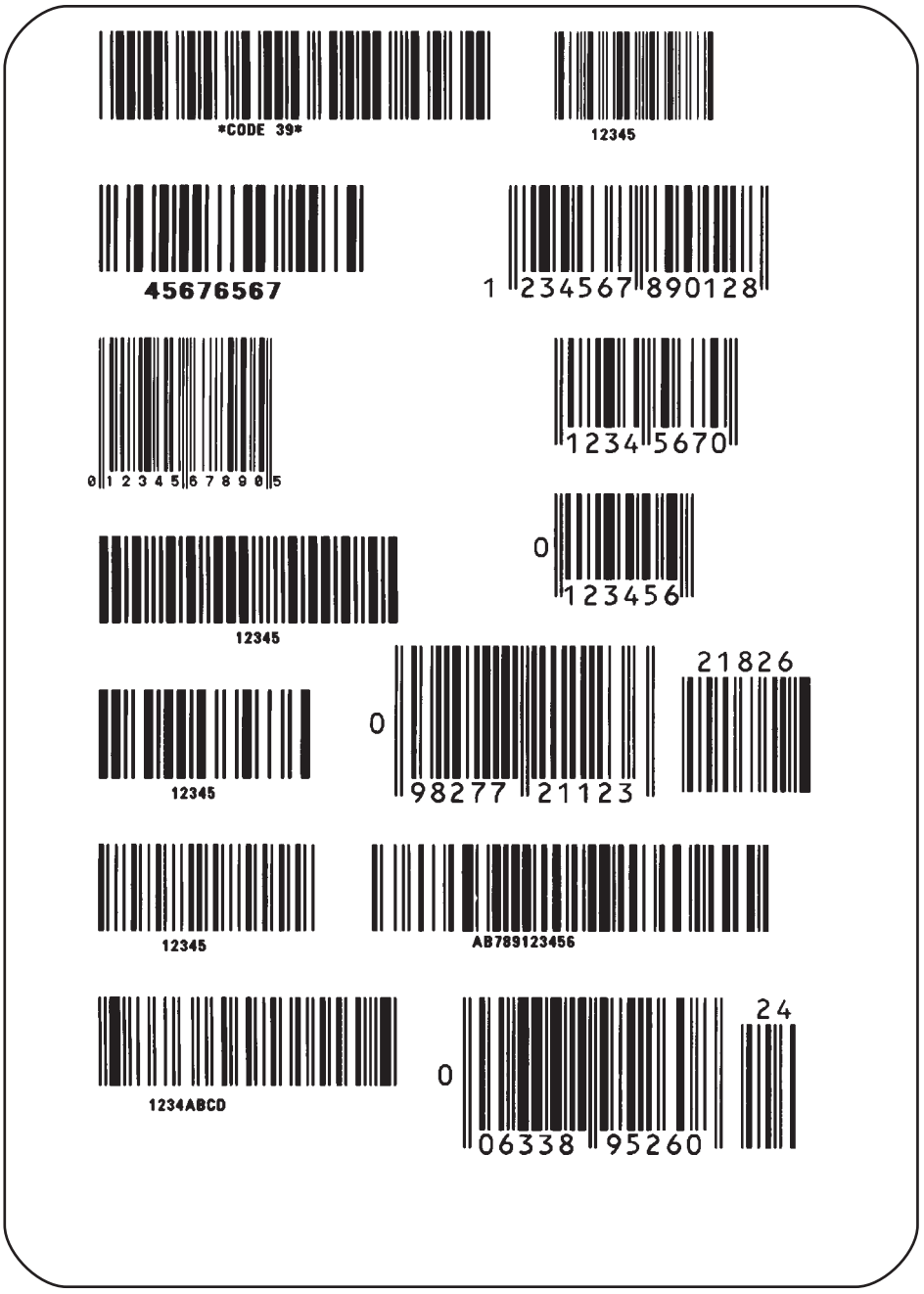
To print bar code images on a label. With this command, there are 13 standard bar code symbologies available to be printed and three two dimensional symbols (see Two Dimensional bar code symbols). Each of the bar codes are unique, and it is important to know the differences. See Appendix B for specific information on using each individual bar code symbol.

Input to Printer

<ESC>A
<ESC>H0025<ESC>V0025<ESC>B103100*CODE 39*
<ESC>H0155<ESC>V0130<ESC>XS*CODE 39*
<ESC>H0025<ESC>V0200<ESC>BD20210045676567
<ESC>H0075<ESC>V0310<ESC>XM45676567
<ESC>H0025<ESC>V0375<ESC>BD30215001234567890
<ESC>H0025<ESC>V0600<ESC>BD50210012345
<ESC>H0175<ESC>V0710<ESC>XS12345
<ESC>H0025<ESC>V0775<ESC>BD60210012345
<ESC>H0105<ESC>V0885<ESC>XS12345
<ESC>H0025<ESC>V0950<ESC>BA03100123455
<ESC>H0095<ESC>V1060<ESC>XS12345
<ESC>H0025<ESC>V1125<ESC>BC03100081234ABCD
<ESC>H0080<ESC>V1240<ESC>XS1234ABCD
<ESC>H0525<ESC>V0025<ESC>B002100A12345B
<ESC>H0565<ESC>V0135<ESC>XS12345
<ESC>H0475<ESC>V0200<ESC>BD303100123456789012
<ESC>H0525<ESC>V0375<ESC>BD4031001234567
<ESC>H0525<ESC>V0550<ESC>DE03100123456
<ESC>H0500<ESC>V0600<ESC>OB0
<ESC>H0533<ESC>V0655<ESC>OB123456
<ESC>H0350<ESC>V0725<ESC>D30315009827721123
<ESC>L0101<ESC>H0320<ESC>V0800<ESC>OB0
<ESC>H0365<ESC>V0878<ESC>OB98277
<ESC>H0505<ESC>V0878<ESC>OB21123
<ESC>H0665<ESC>V0760<ESC>BF0313021826
<ESC>H0680<ESC>V0730<ESC>OB21826
<ESC>H0425<ESC>V1125<ESC>D30315000633895260
<ESC>L0101<ESC>H0395<ESC>V1200<ESC>OB0
<ESC>H0440<ESC>V1278<ESC>OB06338
<ESC>H0580<ESC>V1278<ESC>OB95260
<ESC>H0730<ESC>V1155<ESC>BF0314024
<ESC>H0745<ESC>V1125<ESC>OB24
<ESC>H0325<ESC>V0950<ESC>BG03100>GAB>B789>C123456
<ESC>H0435<ESC>V1055<ESC>XSAB789123456
<ESC>Q1<ESC>Z

Note: Carriage Returns and Line Feeds have been added to the command listing for clarity and should not be included in the actual data stream.

Printer Output



UCC-128 Without Incrementing

```
<ESC>A
<ESC>H0100<ESC>V0100<ESC>BI071501012345670000000001
<ESC>Q2<ESC>Z
```

With Incrementing

```
<ESC>A<ESC>H0100<ESC>V0100
<ESC>F001+001<ESC>BI071501012345670000000001
<ESC>Q2<ESC>Z
```

Special Notes

1. UPC and EAN bar codes are not affected by the different types of narrow to wide ratios. Instead, the <ESC>D command adds descender bars to these codes where needed to meet UPC specifications. The <ESC>BD command puts decender bars and human readable text below the symbol.

2. The Code 128, UCC 128, MSI, and Code 93 bar codes are not affected by the narrow to wide ratios.

3. The Codabar, Code 39, Industrial 2 of 5, and Matrix 2 of 5 bar codes are affected by the Character Pitch command. This command must be placed before the Bar Code command.

4. See Appendix B for more specific instructions and detailed information regarding individual bar code symbols.

5. Because of their unique characteristics, two-dimensional symbols are covered separately.

6. For UCC128, the FNC1 code is automatically inserted and the Mod 10 and Mod 103 check digits are automatically calculated. For the MSI bar code, the check digit is not automatically calculated.

7. The <ESC>D and <ESC>BD commands are not valid for the MSI, Code 128, Code 93, UPC-E, Bookland, UCC128 and Postnet symbologies.

Bar Codes, Expansion

Command Structure <ESC>**BWaabbb**

aa = Expansion factor by which the width of all bars and spaces will be increased (01-12)

bbb = Bar height by dot (004-600 dots)

Example: <ESC>**BW02100**

Placement: Immediately follows the <ESC>BT command and precedes data to be encoded.

Default: None

Command Function This command works together with the <ESC>BT command to specify an expansion factor and the bar code height for the particular symbol being printed.

Input to Printer:

```
<ESC>A
<ESC>H0050<ESC>V0050<ESC>BT101030103
<ESC>BW04100*1234*
<ESC>Q1<ESC>Z
```

Printer Output:

Special Notes

1. This command must be preceded by the Variable Ratio Bar Codes <ESC>BT command.

2. The following bar codes will be affected by the Character Pitch command: Codabar, Code 39, Interleaved 2 of 5, Matrix 2 of 5.

Bar Codes, Variable Ratio

Command Structure <ESC>**BTabbccddee**

a = Bar Code Symbol:
- 0 Codabar
- 1 Code 39
- 2 Interleaved 2 of 5
- 5 Industrial 2 of 5
- 6 Matrix 2 of 5

bb = Narrow space in dots (01-99)
cc = Wide space in dots (01-99)
dd = Narrow bar in dots (01-99)
ee = Wide bar in dots (01-99)

Example: <ESC>**BT**101030103

Placement: Following print position commands and preceding <ESC>BW

Default: Current setting

Command Function To print a bar code with a ratio other than those specified through the standard bar code commands (B,BD, and D). This is done through individual control of each of the bar code elements (bars, spaces) as shown above. Remember that this command only applies to the five bar code types shown.

Input to Printer:

<ESC>A
<ESC>H0050<ESC>V0050<ESC>**BT101030103**
<ESC>BW03100*1234*
<ESC>Q1<ESC>Z

Printer Output:

Special Notes

1. This command must be immediately followed by the <ESC>BW Bar Code Expansion command.
2. You may use only one variable ratio bar code per label.
3. If the data specified in this command is incorrect, the command is ignored and the ratio used will be based on the previous setting.
4. See Appendix B for more specific instructions and details regarding individual bar code symbols.

Base Reference Point

Command Structure <ESC>**A3H-aaaa-Vbbbb**

- = This character is optional. When present, it specifies that the horizontal offset is in the negative direction. If it is left out the offset direction is positive.

aaaa = Horizontal Print Offset (see Note 7 for field range)

bbbb = Vertical Print Offset (see Note 7 for field range)

Example: <ESC>**A3H100V0050**

Placement: Preceding all images that are based on the new base reference point

Default: Current V and H offset setting

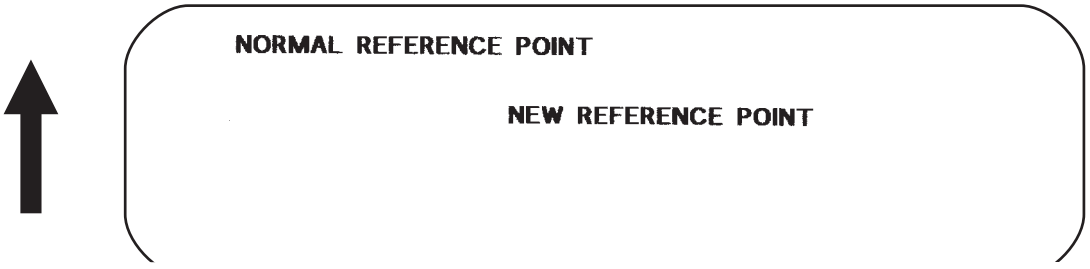
Command Function To establish a new base reference point for the current label. The base reference point is the top left corner or “origin” from where all print position commands are based.

This command may be very helpful when using labels less than four inches wide to place images on the printable label surface. It may also be used to move images past preprinted fields on a label.

Input to Printer:

```
<ESC>A<ESC>L0202
<ESC>H0025<ESC>V0025<ESC>WB0MNORMAL REFERENCE POINT
<ESC>A3H0300V0075
<ESC>H0100<ESC>V0050<ESC>WB0MNEW REFERENCE POINT
<ESC>Q1<ESC>Z
```

Printer Output:



Special Notes

1. Use of this command will set the Vertical/Horizontal Offset setting of the printer configuration until a new Base Reference Point command is issued or the setting is changed from the operator panel. See Section 3: Printer Configuration.

2. This command may be used more than once in a print job.

3. An alternative to using this command is to make changes to your current Horizontal and Vertical Print Position commands.

   Example:
   Let's say the current base reference point is H=1, V=1 and you wish to move all the fields on your label downward vertically by 150 dots. You could either (1) add the Base Reference Point command or (2) change all the vertical position commands by an additional 150 dots.

4. For a more detailed example of the Base Reference Point command, see "Print Area" in this section.

5. The "Se" print engines can print as close as 2 mm to the inside edge of the label.

6. The "Se" print engines will not "wrap" (i.e. if any part of a character or image extends beyond the last print dot position, it will disappear and not be visible on any part of the label).

7. The allowable field ranges for this command are:

	CL408e	**CL412e**	**CL608e**	**CL612e**
Horizontal **aaaa**	-832 to 832	-1248 to 1248	-1216 to 1216	-1984 to 1984
Vertical Default **bbbb**	0001 to 1424	0001 to 2136	0001 to 1424	0001 to 2136
Expanded **bbbb**	0001 to 9999	0001 to 9999	0001 to 9999	0001 to 9999

Characters, Custom-Designed

Command Structure

Store Command: <ESC>**Tabcc**
Recall Command: <ESC>**Kab90cc**

a = 1 16x16 matrix
2 24x24 matrix

b = Specifies the character encoding method
H Hexadecimal characters
B Binary characters

cc = Memory location to store/recall the character. Valid memory locations are 21_H to 52_H or "!" to "R" in Binary

(data) = Data to describe the character

Example: <ESC>**T1H3F**
<ESC>**K1H903F**
See Appendix C for a more detailed explanation

Placement: The Store command is sent in its own data stream to the printer, between the Start/Stop commands. The Recall command is sent in a secondary data stream to print the character,and follows any necessary position or size commands.

Default: None

Command Function

To allow for the creation, storage, and printing of custom characters, such as special fonts or logos. Up to 50 individual characters may be stored in the custom character volatile memory.

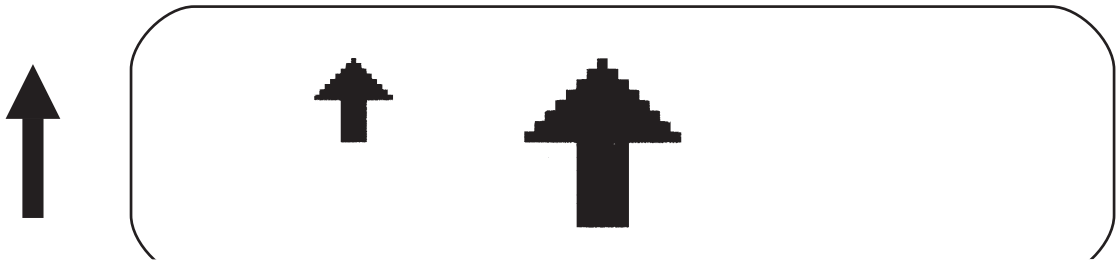
Printer Input

See Appendix C for a detailed explanation.

<ESC>A
<ESC>**T1H3F**
0100038007C00FE01FF03FF87FFCFFFE07C007C007
C007C007C007C007C007C0
<ESC>Z

<ESC>A
<ESC>H150<ESC>V100<ESC>L0505<ESC>**K1H903F**
<ESC>H350<ESC>V100<ESC>L1010<E SC>**K1H903F**
<ESC>Q1<ESC>Z

Printer Output



Special Notes

1. When printing the custom character using the Recall command, the character is affected by the following commands:

   Character Expansion
   Character Pitch
   Line Feed
   Rotate, Fixed Base Reference Point

2. The characters are stored in volatile memory and must be reloaded if the printer power is lost.

3. Do not use ASCII <CR> or <LF> characters (carriage return or line feed) as line delimiters within the graphic data or the actual image will not be printed as specified.

Character Expansion

Command Structure **<ESC>Laabb**

aa = Multiple to expand horizontally (01-12)
bb = Multiple to expand vertically (01-12)

Example: <ESC>**L**0305

Placement: Preceding the data to be expanded

Default: <ESC>**L**0101

Command Function To expand characters independently in both the horizontal and vertical directions. The command allows you to enlarge the base size of each font (except the vector font) up to 12 times in either direction. Expanded characters are typically used for added emphasis or for long distance readability.

Input to Printer

```
<ESC>A<ESC>H0100<ESC>V0100<ESC>XMSATO
<ESC>H0100<ESC>V0200<ESC>L0402<ESC>XMSATO
<ESC>H0100<ESC>V0300<ESC>L0204<ESC>XMSATO
<ESC>Q1<ESC>Z
```

Printer Output

Special Notes

This command will expand the following fonts:

1. Fonts U, S, M, XU, XS, XM, OA & OB and fonts WB, WL, XB and XL.

2. This command will also affect the following commands:
   Character Pitch
   Characters, Custom-Designed

3. The Character Expansion value is in effect for the current print job until a new expansion command is specified.

4. The Line and Box command, if used within the data stream, may return all subsequent text to the default expansion of 1 x 1. Therefore, either send the Character Expansion command before all printed data, or send Line and Box commands last, preceding the <ESC>Q Quantity command.

PROPORTIONAL SPACING
FIXED SPACING

Character Pitch

Command Structure <ESC>**Paa**

aa = Number of dots between characters (00-99)

Example: <ESC>P03

Placement: Preceding the text to be printed

Default: <ESC>**P02**

Command Function To designate the amount of spacing (in dots) between characters. This command provides a means of altering character spacing for label constraints or to enhance readability.

Input to Printer:

```
<ESC>A
<ESC>H0025<ESC>V0025<ESC>L0202<ESC>XB1SATO
<ESC>H0025<ESC>V0125<ESC>L0202<ESC>P20<ESC>XB1SATO
<ESC>H0025<ESC>V0225<ESC>L0202<ESC>P40<ESC>XB1SATO
<ESC>Q1<ESC>Z
```

Printer Output:

Special Notes

1. This command is affected by the <ESC>L Character Expansion command. The character pitch is actually the product of the current horizontal expansion multiple and the designated pitch value.

   Example:
   <ESC>L0304
   <ESC>P03
   Pitch = (03) x (03) = 9 dots

2. To avoid confusion, you may want to include the <ESC>L Character Expansion command and this command together in your program.

3. This command affects fonts U, S, M, XU, XS, XM, OA & OB, WB, WL, XB and XL, and the vector font.

4. Character Pitch will always revert to the default value unless it is specified before each new font command in the data stream.

5. This command also affects Codabar, Code 39 and Industrial 2 of 5 bar codes.

Character, Proportional Spacing

Command Structure

<ESC>**PS** Set to proportional spacing
<ESC>**PR** Reset to fixed spacing

Example: See above

Placement: Preceding the data to be proportional spaced

Default: <ESC>PS

Command Function

To specify the printing of proportional or fixed spacing for proportionally spaced fonts.

Printer Input

```
<ESC>A
<ESC>H0025<ESC>V0050<ESC>PS
<ESC>L0202<ESC>XMPROPORTIONAL SPACING
<ESC>H0025<ESC>V0130<ESC>PR
<ESC>L0202<ESC>XMFIXED SPACING
<ESC>Q1<ESC>Z
```

Printer Output

Special Notes

1. Once this command is sent in the data stream, it is in effect until the end of the print job unless a reset command is sent.

Clear Print Job(s) & Memory

Command Structure <ESC>***a**

a = If the “a” parameter is not included with this command and the printer is in the multi-buffer mode, this command clears all print jobs in the printer memory, including the current print job.

a = If “a” is included with this command, it specifies the internal memory section to be cleared
- T To clear the custom character memory
- & To clear the form overlay memory
- X To clear all internal memory

Example: <ESC>*
<ESC>***&**

Placement: This command should be sent to the printer as an independent data stream.

Default: None

Command Function To clear individual memory or buffer areas of the printer.

Input to Printer:
```
<ESC>A
<ESC>*
<ESC>Z
```

Printer Output: There is no printer output as a result of this command. The current print job in the buffer will be terminated and all other print jobs in the buffer cleared.

Special Note

1. See Expanded Memory Functions for variations of this command used to clear data from the optional Expanded Memory.
2. It is not necessary to clear the printer’s memory between each print job.
3. The primary purpose of this command is to clear all print jobs in the multi-buffer mode. The “a” parameter can be used in either the multi-buffer or single job mode to clear specific parts of the memory.
4. When the “a” parameter is used, the section of memory specified will not be cleared until the label is printed.

Continuous Forms Printing

Command Structure None

The printer locates the end of an adhesive label by sensing the backing between labels or through the use of an eye-mark (black rectangle on the reverse side of the backing). It locates the end of a tag from a notch, eye-mark, or a hole between tags. Both sensors should be disabled when printing continuous forms by placing the Label Sensor Selection switch (DSW3-3) in the ON position. See *Section 3: Printer Configuration* for instructions on configuring the printer using the front panel DIP switch array.

If you will be using continuous labels or tags, the printer must be told to stop feeding in another manner. The length is determined by the position of the last printed image on the label or tag. The printer will stop feeding when this last field is finished printing. The length may be increased with printed spaces (20 hexadecimal) if necessary. There is no command code to control label length.

Copy Image Area

Command Structure <ESC>**WDHaaaaVbbbbXccccYdddd**

aaaa = Horizontal position of the top left corner of the copy area

bbbb = Vertical position of the top left corner of the copy area

cccc = Horizontal length of the image area to be copied

dddd = Vertical length of the image area to be copied

Example: <ESC>**WDH0100V0050X0600Y0400**

Placement: Anywhere within the data stream, after specifying the location of the duplicate image.

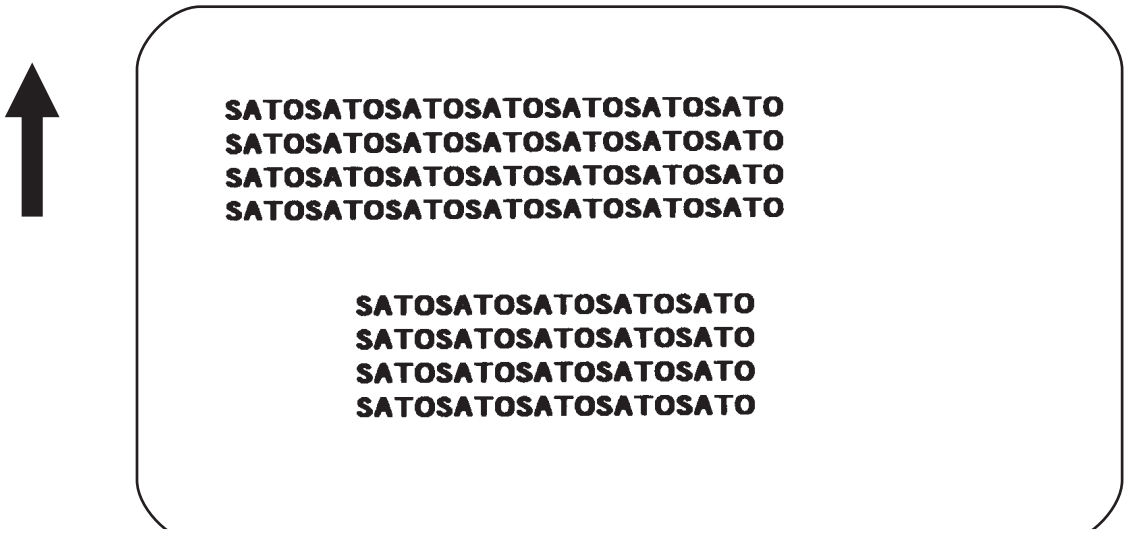
Default: None

Command Function To copy an image from one location to another on the same label. This may be useful for duplicating individual fields or entire sections of the label with only one command.

Input to Printer:

```
<ESC>A
<ESC>H0050<ESC>V0050<ESC>E010<ESC>XM
SATOSATOSATOSATOSATOSATOSATO
SATOSATOSATOSATOSATOSATOSATO
SATOSATOSATOSATOSATOSATOSATO
SATOSATOSATOSATOSATOSATOSATO
<ESC>H0180<ESC>V0250<ESC>WDH0130V0050X0400Y0200
<ESC>Q1<ESC>Z
```

Printer Output:



Special Notes

1. Use the Print Position commands (V and H) to locate the new area for the duplicate image.
2. Position of the new target area must not be inside the original image.
3. If you use the Rotate command, V, H, X and Y axis will be reversed.
4. If the reference area of the target image exceeds the print area, it will not be printed.
5. The allowable ranges for these fields are as follows:

	CL408e	**CL412e**	**CL608e**	**CL612e**
Horizontal **aaaa** **cccc**	0001 to 0832	0001 to 1248	0001 to 1216	0001 to 1984
Default Vertical **bbbb** **dddd**	0001 to 1424	0001 to 1424	0001 to 1424	0001 to 2136
Expanded Vertical **bbbb** **dddd**	0001 to 9999	0001 to 9999	0001 to 9999	0001 to 9999

Cut

ESC>**~Aaaaa**

aaaa = Number of labels to print between each cut (1-9999)

Example: <ESC>**~A2**

Placement: Preceding the <ESC>Q Print Quantity command.

Default: <ESC>**~A1** (if cutter enabled)

Command Function

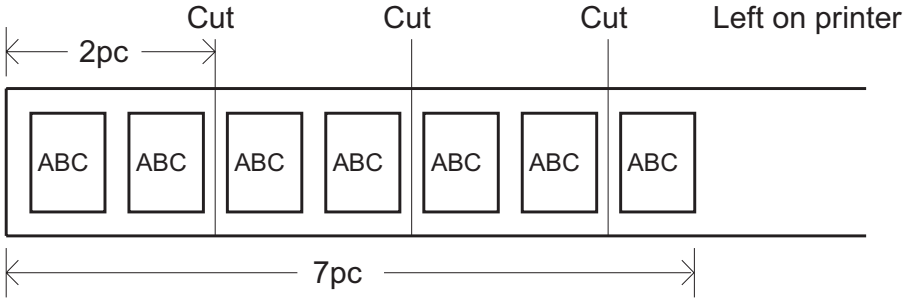
To control the cutting of labels when using a SATO cutter unit with the printer printer. This command allows the cutting of a multi-part tag or label at a specified interval within a print job. It differs from the <ESC>~ Cut Job command in that it does not interact with the quantity command.

Input to Printer:

<ESC>A
<ESC>H0020<ESC>V0020<ESC>XB1ABC<ESC>**~A0002**
<ESC>Q7<ESC>Z

Printer Output:

This set of commands will print seven labels with two labels between each cut. One label will be left in the printer.



Special Notes

1. You must have the optional printer Cutter to use this function. Contact your SATO representative for more information.

2. To use this command, the printer configuration must have the cutter option enabled. See Configuration Commands in this section of the manual.

3. If the cutter option has been enabled in the printer configuration and the cut value (a = 0), the cutter is inactive.

4. This command is independent of the <ESC>Q Quantity command. It will cut the specified number of labels. If a printed label is left in the printer after the last cut, the <ESC>~B Cut/Eject command can be used to cut it.

Cut Job

Command Structure <ESC>**~aaaa**

aaaa = Number of labels to print between each cut (1-9999)

Example: <ESC>**~2**

Placement: Following the Print Quantity command <ESC>Q

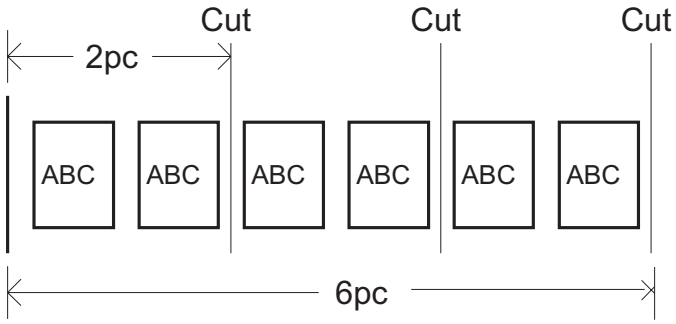
Default: <ESC>**~1** (if cutter enabled)

Command Function To control the cutting of labels when using a SATO cutter unit with the printer printer. This command allows the cutting of a multi-part tag or label at a specified interval within a print job.

Input to Printer

```
<ESC>A
<ESC>H0020<ESC>V0020<ESC>XB1ABC<ESC>Q3
<ESC>~0002
<ESC>Z
```

Printer Output This set of commands will print 6 labels (3 x 2) with two labels between each cut.



Special Notes

1. You must have the optional printer Cutter to use this function. Contact your SATO representative for more information.
2. To use this command, the printer configuration must have the cutter option enabled. See Printer Configuration commands in this section manual.
3. If the cutter option has been enabled in the printer configuration and the cut value (a = 0), the cutter is inactive.
4. A “~” (tilde) character or <NUL> (ASCII 00 Hex) character can be can be used in this command. It is recommended that the “~” be used whenever possible.
5. When using the Cutter command, the total number of labels printed is the product of the cut value and the print quantity.

Cut Last

Command Structure <ESC>**~B**

Example: <ESC>**~B**

Placement: Separate data stream sent to the printer

Default: None

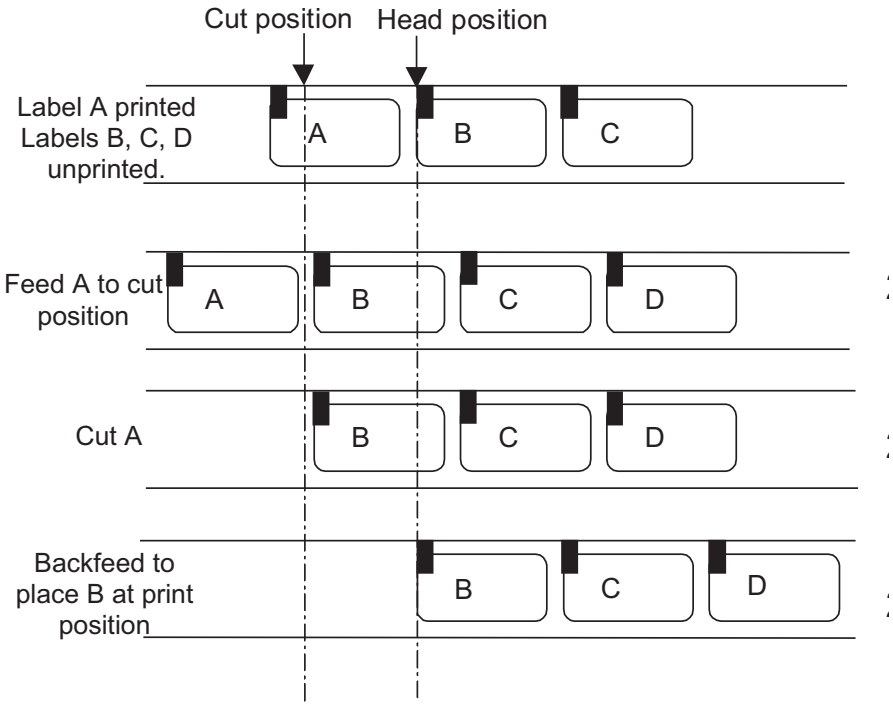
Command Function To control the cutting of labels when using a SATO cutter unit with the printer. This command allows the cutting of a printed multi-part tag or label that is left in the printer after a job is cut using the <ESC>~A Cut command.

Input to Printer

<ESC>A
<ESC>**~A**
<ESC>Z

Printer Output This command will cut the feed the last printed label to the cut position, cut the label and then backfeed to the head position in preparation for printing the next job.

Special Notes



1. You must have the optional printer Cutter to use this function. Contact your SATO representative for more information.

Fonts U, S, M, OA, OB, XU, XS & XM

Command Structure

Font XU:	<ESC>**XU**	Font U:	<ESC>**U**
Font XS:	<ESC>**XS**	Font S:	<ESC>**S**
Font XM:	<ESC>**XM**	Font M:	<ESC>**M**
Font OA:	<ESC>**OA**	Font OB:	<ESC>**OB**

Example: See above

Placement: Preceding the data to be printed

Default: None

Command Function

To print text images on a label. These are eight of the built-in fonts available on the printer. All matrices include descenders.

	NON-PROPORTIONAL		PROPORTIONAL(1)
U	5W x 9H dot matrix	XU	5W x 9H dot matrix
S	8W x 15H dot matrix	XS	17W x 17H dot matrix
M	13W x 20H dot matrix	XM	24W x 24H dot matrix
OA	OCR-A font (see note 7 for matrix)		
OB	OCR-B font (see note 7 for matrix)		

(1) These fonts will be printed with proportional spacing only if preceded by an <ESC>PS command.

Input to Printer

```
<ESC>A<ESC>PS
<ESC>H0001<ESC>V0100<ESC>L0202<ESC>XUSATO
<ESC>H0001<ESC>V0175<ESC>L0202<ESC>XSSATO
<ESC>H0001<ESC>V0250<ESC>L0202<ESC>XMSATO
<ESC>H0001<ESC>V0325<ESC>L0101<ESC>OASATO
<ESC>H0001<ESC>V0400<ESC>L0101<ESC>OBSATO
<ESC>H0300<ESC>V0100<ESC>L0202<ESC>USATO
<ESC>H0300<ESC>V0175<ESC>L0202<ESC>SSATO
<ESC>H0300<ESC>V0250<ESC>L0202<ESC>MSATO
<ESC>Q1<ESC>Z
```

Printer Output

Special Notes

1. Characters may be enlarged through the use of the Character Expansion command.

2. Character spacing may be altered through the use of the Character Pitch command. The default is 2 dots between characters. It is recommended to use a spacing of 5 dots for OCR-A and 1 dot for OCR-B.

3. You may also create custom characters or fonts. See the <ESC>T Custom-Designed Characters command.

4. A font must be defined for each field to be printed. There is no default font.

5. Fonts U, S, M, OA and OB are identical to fonts U, S, M, OA and OB on the SATO M-8400 printer. (Note: These fonts, except the OA and OB fonts which are fixed in size, will be 33% smaller on an CL12e and CL612e).

6. The proportionally spaced fonts XU, XS, XM, XL and XA can be printed with fixed spacing using the <ESC>PS Proportional Space command.

7. The matrices for the OA and OB fonts are scaled so that they will remain a constant size according to the OCR-A and OCR-B specifications when printed on different resolution printers.

	CL408e/CL608e	**CL412e/CL612e**
OA Font	15 dots W x 22 dots H	22 dots W x 33 dots H
OB Font	20 dots W x 24 dots H	30 dots W x 36 dots H

Font, Raster

Command Structure <ESC>**RDabb,ccc,ddd,nn. . .n**

a = A CG Times font style
B CG Triumvirate font style.
bb = 00 for Normal font
01 for Bold font
ccc = Horizontal size (16 - 999 dots or P08 - P72)
ddd = Vertical size (16 - 999 dots or P08 - P72)
nn..n = Data to be printed.

Example: <ESC>RDA00,014,018ABCD

Placement: Within normal command stream

Default: None

Command Function To print point size characters created using font definitions.

Input to Printer

```
<ESC>A
<ESC>V0100<ESC>H0100
<ESC>RDA00,014,018ABCD
<ESC>V0200<ESC>H0100
<ESC>RDB10,018,014ABCD
<ESC>Q1<ESC>Z
```

Printer Output

Sample to be added

Special Notes

1. The “cccc” Horizontal Size and “dddd” Horizontal Size parameters can be entered either in dots or points, but both parameters must use the same value types. If point size is used, the point size is preceded by a “P”.

Font, Vector

Command Structure

Specify Vector Font: <ESC>**$a,b,c,d**

Data for Vector Font: <ESC>**$=(data)**

a = A Helvetica Bold (proportional spacing)
B Helvetica Bold (fixed spacing)
b = Font width (50-999)
c = Font height (50-999 dots)
d = Font variation (0-9) as follows:
0 Standard
1 Standard open (outlined)
2 Gray (mesh) pattern 1
3 Gray (mesh) pattern 2
4 Gray (mesh) pattern 3
5 Standard open, shadow 1
6 Standard open, shadow 2
7 Standard mirror image
8 Italic
9 Italic open, shadow

Example: <ESC>**$A,100,200,0<ESC>$=123456**

Placement: Immediately preceding data to be printed.

Default: None

Command Function

To specify printing of the unique SATO vector font. The vector font allows large characters to be printed with smooth, round edges. Each character is made of a number of vectors (or lines), and will require slightly more printer compiling time.

Input to Printer

<ESC>A
<ESC>H0100<ESC>V0100<ESC>**$A,100,100,0**<ESC>$=SATO AMERICA
<ESC>H0100<ESC>V0200<ESC>**$=**VECTOR FONT
<ESC>H0100<ESC>V0350<ESC>**$A**,200,300,8<ESC>$=SATO
<ESC>Q1<ESC>Z

Printer Output

Special Notes

1. The Pitch command can be used with Vector fonts.
2. If the font size designation is out of the specified range, a default value of 50 is used.
4. The font width and height values include asenders, desenders and other space.
5. A font must be defined for each field to be printed. There is no default font.

Fonts WB, WL, XB & XL

Command Structure

Font WB: <ESC>**WBa** Font XB: <ESC>**XBa**
Font WL: <ESC>**WLa** Font XL: <ESC>**XLa**

a = 0 Disables auto-smoothing of font
1 Enables auto-smoothing of font (see notes below)

Example: <ESC>**WB1123456**

Placement: Preceding the data to be printed

Default: None

Command Function

To print text images on a label. These are the four auto-smoothing fonts available on the printer.

	NON-PROPORTIONAL		PROPORTIONAL(1)
WB	18W x 30H dot matrix	XB	48W x 48H dot matrix
WL	28W x 52H dot matrix	XL	48W x 48H dot matrix

(1) These fonts will be printed with proportional spacing only if preceded by an <ESC>PS command.

Input to Printer:

<ESC>A<ESC>PS
<ESC>H0001<ESC>V0100<ESC>**WB0SATO**
<ESC>H0001<ESC>V0185<ESC>**WB1SATO**
<ESC>H0001<ESC>V0270<ESC>**WL0SATO**
<ESC>H0001<ESC>V0355<ESC>**WL1SATO**
<ESC>H0300<ESC>V0100<ESC>**XB0SATO**
<ESC>H0300<ESC>V0185<ESC>**XB1SATO**
<ESC>H0300<ESC>V0270<ESC>**XL0SATO**
<ESC>H0300<ESC>V0355<ESC>**XL1SATO**
<ESC>Q1<ESC>Z

Printer Output:

Special Notes

1. Auto-smoothing (when enabled) is only effective if the character expansion rate is at least (3) times in each direction.

2. Characters may be enlarged through the use of the <ESC>L Character Expansion command.

3. Character spacing may be altered through the use of the <ESC>A Character Pitch command.

4. A font must be defined for each field to be printed. There is no default font.

5. The proportionally spaced fonts XU, XS, XM, XL and XB can be printed with fixed spacing using the <ESC>PS Proportional Space command.

Form Feed

Command Structure <ESC>A**(space)**<ESC>Z

Example: See above

Placement: Separate data stream sent to printer

Default: None

Command Function To feed a blank tag or label, which is the equivalent of a “form feed”

Input to Printer

<ESC>A**(space)**
<ESC>Z

Printer Output Blank label or tag

Form Overlay, Recall

Command Structure <ESC>/

Example: See above

Placement: Must be preceded by all other data and placed just before the Print Quantity command (<ESC>Q)

Default: None

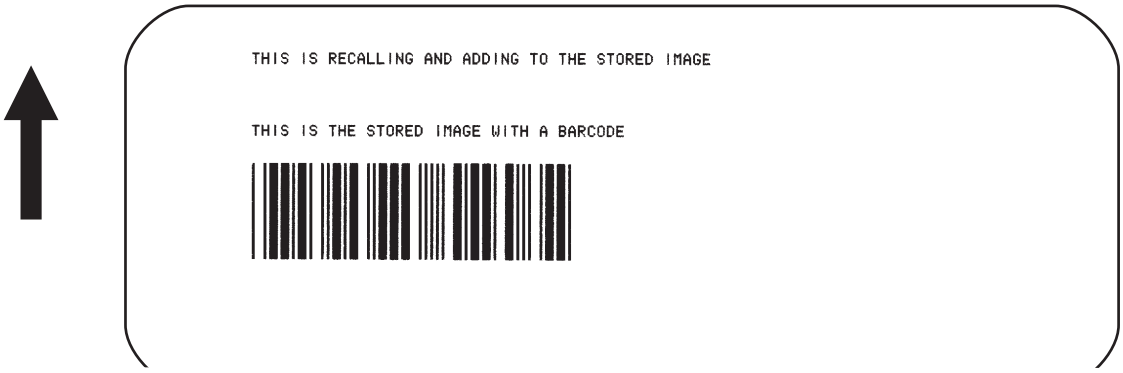
Command Function To recall the label image from the form overlay memory for printing. This command recalls a stored image from the overlay memory. Additional or different data can be printed with the recalled image.

Input to Printer

```
<ESC>A
<ESC>H01000<ESC>V0125
<ESC>STHIS IS THE STORED IMAGE WITH A BARCODE
<ESC>H0100<ESC>V0165<ESC>B103100*12345*
<ESC>&<ESC>Z


<ESC>A<ESC>H0100<ESC>V0050
<ESC>STHIS IS RECALLING AND ADDING TO THE STORED IMAGE<ESC>/
<ESC>Q1<ESC>Z
```

Printer Output



Special Notes

1. The overlay is stored using the <ESC>& Form Overlay Store command.
2. If the this command is used with the <ESC>EX0 Expanded Print Length command the Form Overlay length cannot exceed 9999 dots.

Form Overlay, Store

Command Structure <ESC>**&**

Example: See above

Placement: Must be preceded by all other data and placed just before the Stop command (<ESC>Z)

Default: None

Command Function To store a label image in the volatile form overlay memory. Only one label image may be stored in this memory area at a time.

Input to Printer

```
<ESC>A
<ESC>H0100<ESC>V0125
<ESC>STHIS IS THE STORED IMAGE WITH A BARCODE
<ESC>H0100<ESC>V0165<ESC>B103100*12345*
<ESC>&
<ESC>Z
```

Printer Output There is no output from this command. It stores the label image in the overlay buffer.

Special Notes

1. Remember that this storage is volatile. Therefore, if the printer loses power, the overlay must be sent again.
2. The overlay is recalled using the <ESC>/ Form Overlay Recall command.
3. Form overlays do not have to be recompiled each time they are called to be printed and therefore may result in much faster print output.

Graphics, Custom

Command Structure <ESC>**Gabbbccc(data)**

a = Specifies format of data stream to follow
B Binary format
H Hexadecimal format

bbb = Number of horizontal 8 x 8 blocks
(see note 7 for allowable range)

ccc = Number of vertical 8 x 8 blocks
(see note 7 for allowable range)

(data)= Hex data to describe the graphic image

Example: <ESC>GH006006
See Appendix C for a detailed example

Placement: May be placed anywhere within the data stream after the necessary position commands.

Default: None

Command Function To create and print custom graphics (logos, pictures, etc.) on a label. The graphic image may be printed along with other printed data to enhance label appearance or eliminate the need for preprinted label stock. Using a dot-addressable matrix, design the graphic image in 8 dot by 8 dot blocks, then send it in a binary format to the printer.

Printer Input

```
<ESC>A
<ESC>H0100<ESC>V0100<ESC>GH006006
FFFFFFFFFFFFFFFFFFFFFFFFC00000000003
C00000000003C000FFFFFFF3C00080000013
C00080000013C0009FFFFF13C00080000013
C00080000013C0009FFFFF13C00080000013
C00080000013C000FFFFFFF3C00000000003
C00000000003C00000000003C00000000003
C00000000003C00000000003C00003C00003
C00007E00003C0000FF00003C0000FF00003
C0000FF00003C0000FF00003C00007E00003
C00003C00003C00003C00003C00003C00003
C00003C00003C00003C00003C00003C00003
C00003C00003C00003C00003C00003C00003
C00003C00003C00001800003C00000000003
C00000000003FFFFFFFFFFFFFFFFFFFFFFFF
<ESC>H0300<ESC>V0100<ESC>XSPLEASE PLACE YOUR DISK
<ESC>H0300<ESC>V0150<ESC>XSIN A SAFE PLACE
<ESC>Q1<ESC>Z
```

See Appendix C for a details on the data format.

Printer Output

Special Notes

1. Do not use ASCII <CR> or <LF> characters (carriage return or line feed) as line delimiters within the graphic data or the actual image will not be printed as specified.

2. A custom graphic cannot be enlarged by the <ESC>L Character Expansion command.

3. A custom graphic is not affected by either of the Rotation commands. Therefore, always design and locate your graphic image to print in the appropriate orientation.

4. To store graphic images in optional Expanded Memory, see the Expanded Memory Functions section.

6. The binary format reduces the transmission time by 50%.

7. The maximum allowable settings are:

	CL408e	**CL412e**	**CL608e**	**CL612e**
Hor Blocks **bbb**	001 to 104	001 to 156	001 to 152	001 to 248
Vertical Blocks Default **ccc**	001 to 178	001 to 267	001 to 178	001 to 267
Expanded **ccc**	001 to 999	001 to 999	001 to 999	001 to 999

8. Use the <ESC>E0 Expanded Print Length command to get the maximum label length.

Graphics, BMP

Command Structure <ESC>**GMaaaaa,**(data)

aaaaa = Number of bytes to be downloaded

Example: <ESC>**GM32000**, ... data...

Placement: Anywhere within the job data stream

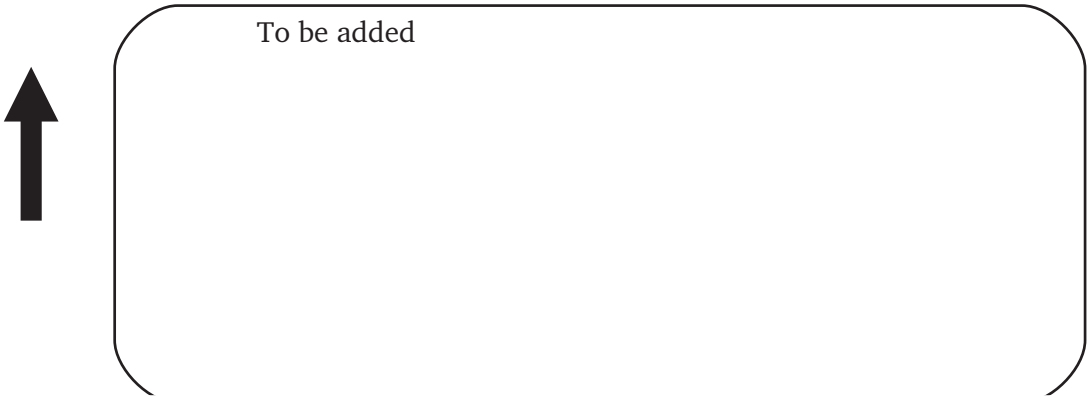
Default: None

Command Function To allow the creation and printing of graphic images using a BMP file format.

Printer Input See Appendix Appendix C for a detailed example

```
<ESC>A
<ESC>V0150<ESC>H0100<ESC>GM03800,(...Data...)
<ESC>Q1
<ESC>Z
```

Printer Output



Special Notes

1. The maximum number of bytes that can be downloaded is 32K (compressed). The number specified by this command includes the BMP header information. The maximum size of the uncompressed BMP file is 64K. If the uncompressed file exceeds 64K, the graphic will not print.
2. Only black and white BMP files can be downloaded.
3. The file size specified by this command is the DOS file size in bytes.

Graphics, PCX

Command Structure <ESC>**GPaaaaa,**(data)

aaaaa = Number of bytes to be downloaded

Example: <ESC>**GP32000**, ... data...

Placement: Anywhere within the job data stream

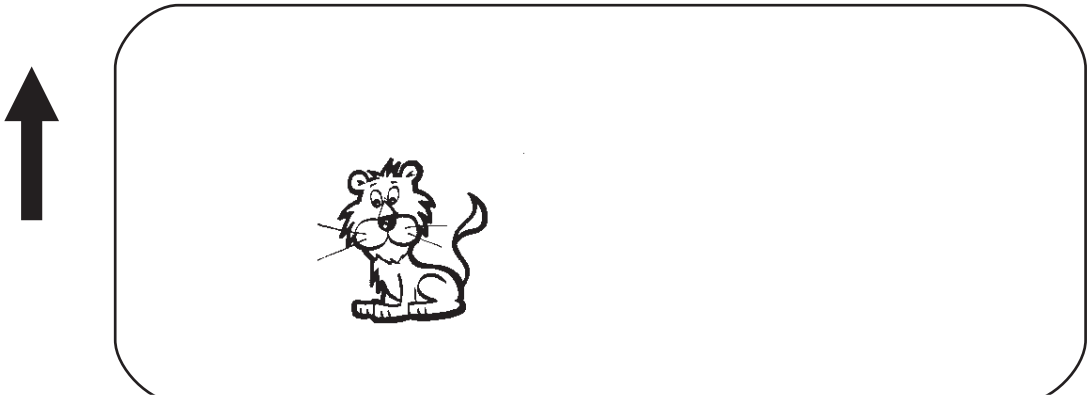
Default: None

Command Function To allow the creation and printing of graphic images using a PCX file format.

Printer Input See Appendix Appendix C for a detailed example

```
<ESC>A
<ESC>V0150<ESC>H0100<ESC>GP03800,(...Data...)
<ESC>Q1
<ESC>Z
```

Printer Output



Special Notes

1. The maximum number of bytes that can be downloaded is 32K (compressed). The number specified by this command includes the PCX header information. The maximum size of the uncompressed PCX file is 64K. If the uncompressed file exceeds 64K, the graphic will not print.

2. Only black and white PCX files can be downloaded.

3. The file size specified by this command is the DOS file size in bytes.

Job ID Store

Command Structure

<ESC>**IDaa**

aa = Job ID assigned (01 to 99)

Example: <ESC>**ID09**

Placement: Immediately following the <ESC>A in the data stream.

Default: None

Command Function

To add an identification number to a job. The status of the job can then be determined using the ENQ command in the Bi-Com status mode (See Section 5: Interface Specifications for more information).

Printer Input

<ESC>A
<ESC>**ID02**
. . . Job . . .
<ESC>Z

Printer Output

There is no printer output as a result of this command.

Special Notes

1. Works only in Bi-Communications modes. The Job ID number must be stored before Bi-Com status mode can be used.

2. If more than one ID number is sent in a single job, i.e.

   <ESC>A
   <ESC>ID01
   . . . . . .
   <ESC>ID02
   . . . . . .

   the last number transmitted will be used.

Job Name

Command Structure

<ESC>**WKnnn. . . n**

nn..n = Job Name assigned, up to 16 ASCII characters

Example: <ESC>**WKSATO**

Placement: Immediately following the <ESC>A in the data stream.

Default: None

Command Function

This command is to identify a particular job using a descriptive name

Printer Input

<ESC>A
<ESC>**WKSATO**
. . . Job . . .
<ESC>Z

Printer Output

There is no printer output as a result of this command. The information is returned to the host upon receipt of a Bi-Com status request.

Special Notes

1. Works only in Bi-Com 4 mode. The Job Name must be stored before Bi-Com status mode can be used.

2. If more than one Job Name is sent in a single job, i.e.

   <ESC>A
   <ESC>WKSATO
   . . . . . .
   <ESC>WKSATO AMERICA
   . . . . . .

   the last name transmitted will be used.

Journal Print

Command Structure <ESC>**J**

Example: See above

Placement: Immediately following <ESC>A

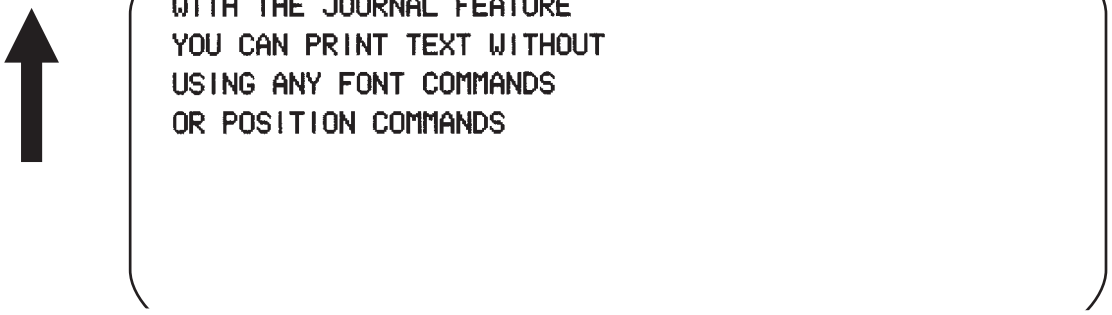
Default: None

Command Function To print text in a line by line format on a label. By specifying this command, you automatically select Font XS with a Character Expansion of 2x2. You also establish a base reference point of H2,V2. The character pitch is 2 dots and the line gap is 16 dots. Simply issue an ASCII <CR> at the end of each text line.

Input to Printer

```
<ESC>A
<ESC>J WITH THE JOURNAL FEATURE
YOU CAN PRINT TEXT WITHOUT
 USING ANY FONT COMMANDS
OR POSITION COMMANDS
<ESC>Q1<ESC>Z
```

Printer Output



Special Notes

1. Journal mode assumes a maximum label width . Otherwise, you may print where there is no label and damage your print head.
2. It is effective only for the current print job.

Lines and Boxes

Command Structure

Line <ESC>**FWaabcccc**

aa = Width of horizontal line in dots (01-99)

b = Line orientation
H Horizontal line
V Vertical Line

cccc = Length of line in dots (see Note 2 for max length)

Box: <ESC>**FWaabbVccccHdddd**

aa = Width of horizontal side in dots (01-99)

bb = Width of vertical side in dots (01-99)

cccc = Length of vertical side in dots (see Note 2 for max)

dddd = Length of horizontal side in dots (see Note 2 for max)

Example: <ESC>**FW02H0200**

Placement: Following the necessary positioning commands

Default: None

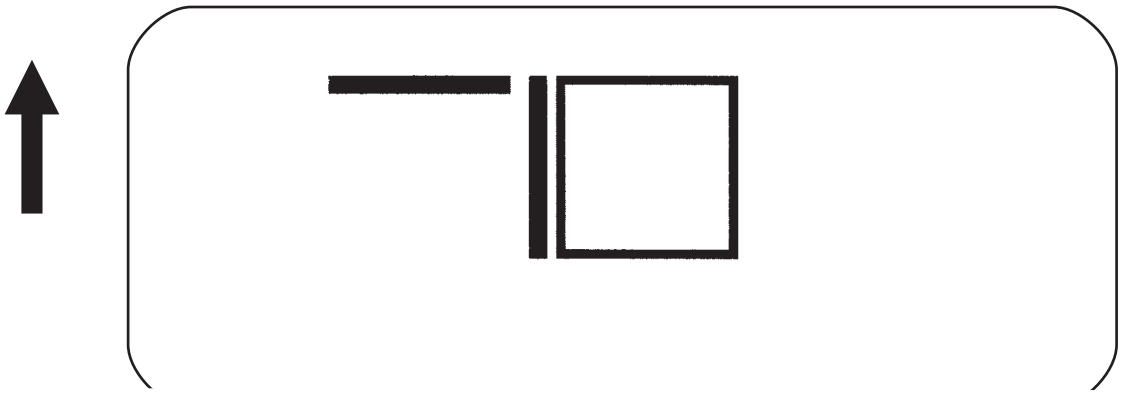
Command Function

To print horizontal lines, vertical lines, and boxes as images on the label.

Input to Printer

<ESC>A
<ESC>H0100<ESC>V0100<ESC>**FW20H0200**
<ESC>H0320<ESC>V0100<ESC**>FW20V0200**
<ESC>H0350<ESC>V0100<ESC>**FW1010H0200V0200**
<ESC>Q1<ESC>Z

Printer Output



Special Notes

1. It is recommended that all lines and boxes be specified in the normal print direction.

2. The maximum allowable lengths are as follows.

LINE/BOX LENGTH	CL408e	CL412e	CL608e	CL612e
Horizontal **cccc**	0001 to 832	0001 to 1248	0001 to 1216	0001 to 1984
Vertical Default **cccc**	0001 to 1424	0001 to 2136	0001 to 1424	0001 to 2136
Expanded **cccc**	0001 to 9999	0001 to 9999	0001 to 9999	0001 to 9999

3. Use the <ESC>E0 Expanded Print Length command for maximum label length.

Line Feed

Command Structure <ESC>**Eaaa**

aaa = Number of dots (001-999) between the bottom of the characters on one line to the top of the characters on the next line

Example: <ESC>**E010**

Placement: Preceding the text that will use the line feed function

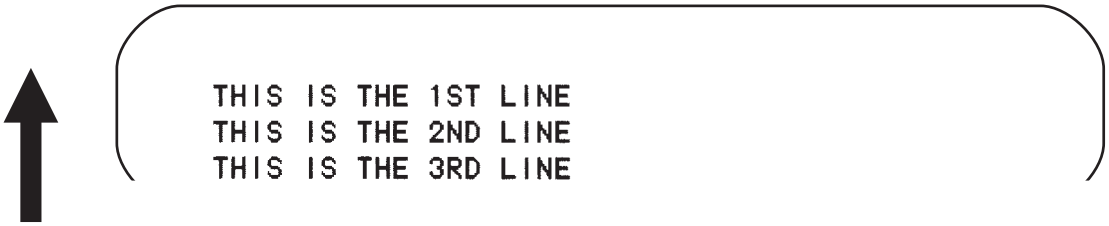
Default: None

Command Function To print multiple lines of the same character size without specifying a new print position for each line. With the Line Feed command, specify the number of dots you want between each line. Then, send an ASCII <CR> at the end of each line of text. The printer automatically identifies the size of the last character, moves down the number of dots specified, and begins printing the next line.

Input to Printer

```
<ESC>A
<ESC>E010<ESC>H0050<ESC>V0050<ESC>L0202<ESC>S
THIS IS THE 1ST LINE<>CR>
THIS IS THE 2ND LINE>CR>
THIS IS THE 3RD LINE>CR>
<ESC>Q1<ESC>Z
```

Printer Output



Special Notes

1. It is effective only for the current data stream.
2. When printing lines or boxes in the same data stream with the Line Feed command, the Lines and Boxes command should be specified last, preceding <ESC>Q Quantity command.
3. This command is invalid only if the value specified is zero.
4. Following this command with a <CR> character will allow you to print with auto line feed. The print position will be determined from the value specified and the H value set in the printer. If you specify several H values after this command, the print position will be determined by the H value last specified. You must redefine the font to be used after each H command.

Media Size

Command Structure <ESC>**A1aaaabbbb**

aaaa = Label Width in dots (0 to Hmax)
bbbb = Label Length in dots (0 to Vmax)

Example: <ESC>A108323200

Placement: Separate data stream to the printer.

Default: <ESC>**A108322136** for CL408e
<ESC>**A112484800** for CL412e
<ESC>**A112161424** for CL608e
<ESC>**A119842136** for CL612e

Command Function To set the size of the media.

Input to Printer:

```
<ESC>A
<ESC>A108321424
<ESC>Z
```

Printer Output: Ther is no printer output resulting from this command. It is used to automatically adjust the offset values for the size of label being used. The sample command stream specifies a label 832 dots wide by 1424 dots long.

Special Notes

1. The Base Reference point is always the on the right (looking at the front of the printer) side of the print head. This command adjusts the Base Reference Point to correspond with the right edge of the loaded media.

2. If the label size is changed, then this command must be respecified to center the print image on the label.

3. All eight variables (“aaaa” and “bbbb”) must be included in this command.

Max	CL408e	CL412e	CL608e	CL612e
Hmax **aaaa**	0832	1248	1216	1984
Vmax Default **bbbb** Expanded **bbbb**	1424 9999	2136 9999	1424 9999	2136 9999

Mirror Image

Command Structure

<ESC>**RM**

Example: <ESC>A1<ESC>**RM**

Placement: After fields to be mirrored

Default: None

Command Function

To allow mirror image printing of data, such as on transparent labels to be applied to a glass or other transparent surface.

Input to Printer

```
<ESC>A
<ESC>A108321424
<ESC>H0100<ESC>V0050<ESC>XL0ABCDEF
<ESC>RM
<ESC>Q1<ESC>Z
```

Printer Output

Special Notes

1. The <ESC>A1 Media Size command must precede this command. The image area specified by the Media Size command will be mirrored. In the example above, The <ESC>A108321424 specifies a label 832 dots wide by 1424 dots long.

2. This command can be used with the <ESC>% Rotate Fixed Base Reference Point command. Please note that the reference point rotation is dependent upon the location of the <ESC>% command in the data stream

3. This command should not be specified more than once in any single job.

4. This command cannot be used with commands requiring re-editing of the print area, such as Sequential Numbering, Real time clock or Copy Image Area.

5. Any data outside the area specified by the Media Size command is not mirrored and the command is treated as a command error. Any print job containing the <ESC>RM command and without any print data will be treated as a command error.

Off-Line/Pause

Command Structure <ESC>**@,nn . . . n**

nn...n = Optional message to be displayed on the LCD. Maximum of 32 characters.

Example: See above

Placement: Anywhere in the print job between the <ESC>A and <ESC>Z

Default: None

Command Function To specify the printer to come to an off-line state. When used within a print job, the printer goes off-line after finishing the print job.

Input to Printer

<ESC>A
<ESC>**@, LOAD BLUE LABELS AND PLACE PRINTER ON-LINE**
...Job...
<ESC>Z

Printer Output There is no printer output for this command. The printer is placed in the Off-Line mode as soon as the current print job is finished.

Special Notes

1. You must press the LINE key on the front panel to return the printer to an On-Line status (see Operator Panel in Section 2 of this manual).

2. Remember, when using this command, that the print job specifies <ESC>Q10, all ten labels will print before the printer goes off-line.

Postnet

Command Structure <ESC>**BPn...n**

n...n = 5 digits (Postnet-32 format)
6 digits (Postnet-37 format)
9 digits (Postnet-52 format)
11 digits (Postnet-62, Delivery Point format)

Example: <ESC>**BP123456789**

Placement: Immediately preceding the data to be encoded

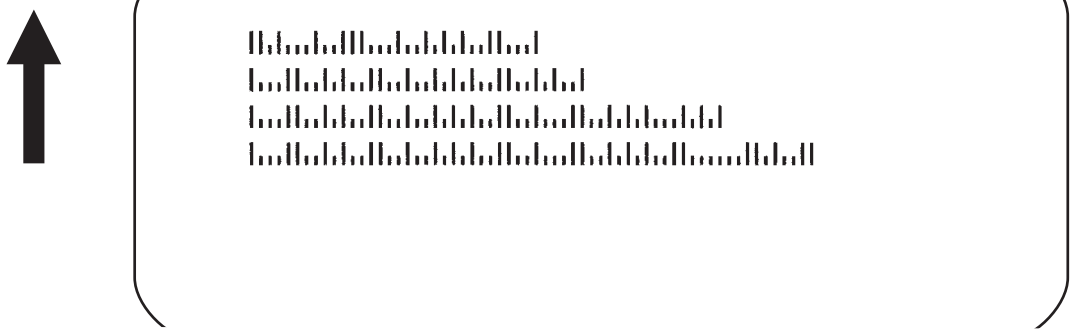
Default: None

Command Function To print Postnet bar codes

Printer Input

```
<ESC>A
<ESC>H0100<ESC>V0120<ESC>BP94089
<ESC>H0100<ESC>V0160<ESC>BP123456
<ESC>H0100<ESC>V0200<ESC>BP123456789
<ESC>H0100<ESC>V0240<ESC>BP12345678901
<ESC>Q1<ESC>Z
```

Printer Output



Special Notes

1. If the number of data digits does not match those listed, the command is ignored.
2. Only numeric data will be accepted.

Print Darkness

Command Structure <ESC>**#Ea**

a = Print Darkness Value
(see note 2 for allowable range)

Example: <ESC>**#E2**

Placement: Must be placed immediately after <ESC>A and immediately before <ESC>Z in its own separate data stream

Default: 2

Command Function To specify a new print darkness settings. This command allows software control of the darkness setting for unique media and ribbon combinations.

Input to Printer

<ESC>A
<ESC>**#E2**
<ESC>Z

Printer Output There is no printer output for this command.

Special Notes

1. This becomes the new setting in the printer configuration for all subsequent print jobs, unless changed. The setting is stored in non-volatile memory and is not affected by cycling power.

2. The allowable ranges for heat settings are:

Heat Range	CL408e/CL412e	CL608e/CL612e
a	1 2 3 4 5	 1 2 3

3 The lighest setting is the smallest value and the darkest setting is the largest value.

Print Length, Expanded

Command Structure

<ESC>EX0 Sets the print length to maximum

<ESC>**AR** Resets the maximum print length to 7" (178 mm)

Example: See above

Placement: Must follow the Start Code command and be in it's own separate data stream.

Default: <ESC>AR (7")

Command Function

To increase the maximum print length (in feed direction) for a label.

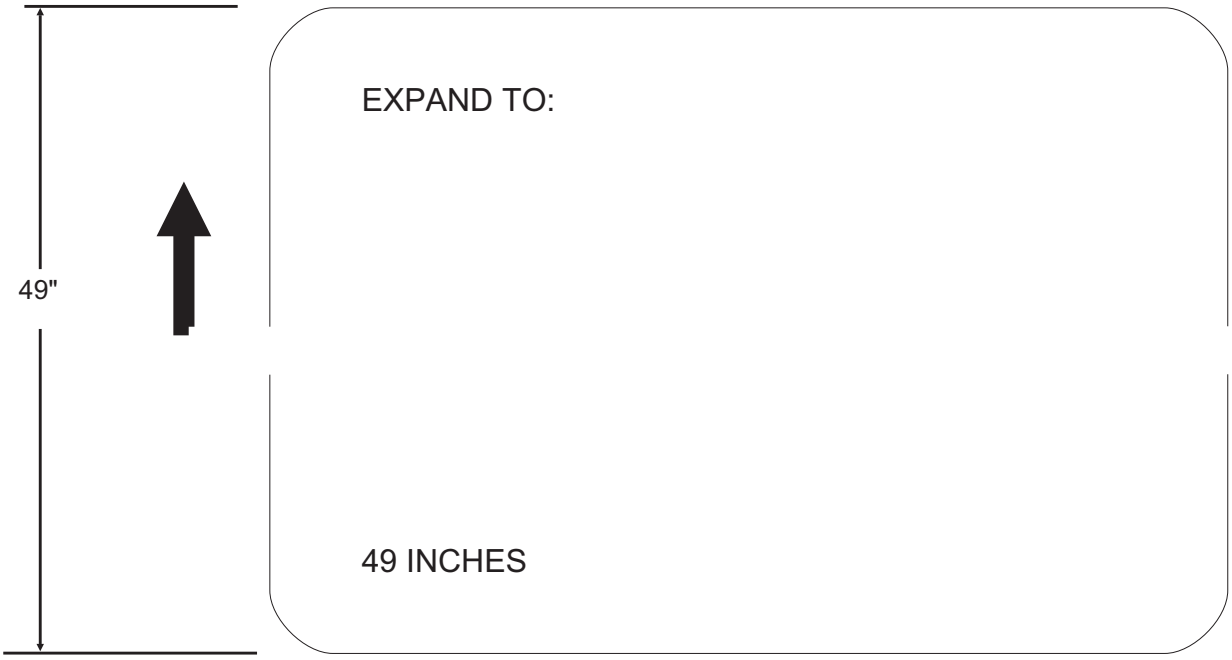
Input to Printer:

```
<ESC>A
<ESC>EX0
<ESC>Z

<ESC>A
<ESC>H0050<ESC>V0100<ESC>WB1EXPAND TO:
<ESC>H0050<ESC>V2700<ESC>WB149 INCHES
<ESC>Q1<ESC>Z

<ESC>A
<ESC>AR
<ESC>Z
```

Printer Output:



Special Notes

1. <ESC>EX0 is effective until <ESC>AR is sent to reset the printer to its standard print length, or until the printer is repowered.

2. It may be included in an independent data stream to specify the size of the maximum print area:

LENGTH	CL408e	CL412e	CL608e	CL612e
<ESC>A **<ESC>EX0** **<ESC>Z**	49.2" 1249 mm 9999 dots	32.8 833 mm 9999 dots	49.2" 1249 mm 9999 dots	32.8" 833 mm 9999 dots
<ESC>A **<ESC>AR** <ESC>Z	7" 178 mm 1424 dots	7" 178 mm 2136 dots	7" 178 mm 1424 dots	7" 178 mm 2136 dots

3. When this command is used with the <ESC>& Store Form Overlay command the Form length cannot exceed the maximum specified.

7. If a job contains elements out of the memory range, it is ignored.

8. If the Forms Overlay command <ESC>& is used with Expanded Memory to expand the print area, the Form Overlay length is still limited to the maximum..

Print Position

Command Structure

Horizontal Position: <ESC>**Haaaa**

Vertical Position: <ESC>**Vbbbb**

aaaa = Number of dots horizontally from the base reference point (1 to maximum) See Note 2.

bbbb = Number of dots vertically from the base reference point (1 to maximum) See Note 2.

Example: <ESC>**H0020**<ESC>**V0150**

Placement: Preceding any printed field description of lines/boxes, fonts, bar codes or graphics.

Default: <ESC>H0001
<ESC>V0001

Command Function

The Horizontal and Vertical commands specify the top left corner of a field or label, using the current base reference point as an origin. They also establish a reference point for subsequent fields until the next horizontal and/or vertical print position command is issued.

Input to Printer

<ESC>A
<ESC>**>H0025<ESC>V0050**<ESC>L0303<ESC>MSATO
<ESC>**H0100<ESC>V0150**<ESC>MSATO
<ESC>Q2<ESC>Z

Printer Output

Special Notes

1. To expand the print length to the maximum limit, the <ESC>EX0 Expanded Print Length command must be used.

	CL408e	CL412e	CL608e	CL612e
Maximum Print Width **aaaa**	832 4.1 in. 104 mm	1248 4.1 in. 104 mm	1216 6.0 in. 152 mm	1984 dots 6.5 in. 165 mm
Default Print Length **bbbb**	1424 dots 7.0 in. 178 mm	2136 dots 7.0 in. 178 mm	1424 dots 7.0 in. 178 mm	2136 dots 7.0" 178mm
Expanded with <ESC>EX0 **bbbb**	9999 dots (1) 49.2 in. 1249 mm	9999 dots (1) 32.8 in. 833 mm	9999 dots (1) 49.2 in. 1249 mm	9999 dots(1) 32.8 in. 833 mm
(1) Limited by the number of digits in the command field.				

2. If any part of an image is placed past the maximum number of dots, that part of the image will be lost.

3. If any part of an image is placed past maximum allowable dots across the label, that part of the image will be lost.

4. If you attempt to print where there is no paper, you may damage the print head.

5. For these commands, the leading zeroes do not have to be entered. The command V1 is equivalent to V0001.

Print Quantity

Command Structure <ESC>**Qaaaaaa**

aaaaaa = Total number of labels to print (1-999999)

Example: <ESC>Q500

Placement: Just preceding <ESC>Z, unless <ESC>NUL exists, then preceding that. This command must be present in every print job.

Default: None

Command Function To specify the total number of labels to print for a given print job.

Input to Printer

```
<ESC>A
<ESC>H0100<ESC>V0100<ESC>WB1SATO
<ESC>Q3
<ESC>Z
```

Printer Output Three labels containing the data “SATO” wll be printed.

Special Notes

1. To pause during a print job, you must press the LINE key on the Operator Panel.
2. To cancel a print job, you must turn off the printer, or you may send the <CAN> code if using the Bi-Com mode. Multi-Buffer jobs can be cleared with the <ESC>* Clear Print Job(s) and Memory command.
3. When used with the <ESC>F Sequential Numbering command, the Print Quantity value should be equal to the total number of labels to be printed.
4. If you do not specify a Print Quantity, the printer will not print a label.
5. For this command, leading zeroes do not have to be entered. The command Q1 is equivalent to Q000001.

Print Speed

Command Structure

<ESC>**CSa**

a = Designates the speed selection (see note 2)

Example: <ESC>**CS6**

Placement: Must be placed immediately after <ESC>A and immediately before <ESC>Z in its own separate data stream

Default: As previously set in the printer configuration

Command Function

To specify a unique print speed through software for a particular label. This allows flexibility in finding the best performance and quality for the particular label format, media, and ribbon. All subsequent labels will print at this speed unless the speed is changed with this command or through the Operator Panel.

Input to Printer

<ESC>A
<ESC**>CS6**
<ESC>Z

Printer Output

There is no printer output for this command. It sets the print speed of the printer.

Special Notes

1. This becomes the new setting for all subsequent print jobs, unless changed. The setting is stored in non-volatile memory and is not affected by cycling the power. The allowable speed ranges are:

CL408e/CL412e	CL608e/CL612e
1 = 2 ips (50 mm/sec)	4 = 4 ips (100 mm/sec)
2 = 3 ips (75 mm/sec)	6 = 6 ips (150 mm/sec)
3 = 4 ips (100 mm/sec)	8 = 8 ips (200 mm/sec)
4 = 5 ips (125 mm/sec)	
5 = 6 ips (150 mm/sec)	

Repeat Label

Command Structure <ESC>**C**

Example: See above

Placement: Must be placed immediately after <ESC>A and immediately before <ESC>Z in its own separate data stream

Default: None

Command Function To print duplicate of the last label printed

Input to Printer

```
<ESC>A
<ESC>C
<ESC>Z
```

Printer Output A duplicate of the previous label will be printed.

Special Notes

1. This command will have no effect if the power to the printer was cycled off and back on since printing the previous label.

Replace Data (Partial Edit)

Command Structure <ESC>**0** (<ESC>zero)

Example: See above

Placement: Must follow <ESC>A and precede all other print data

Default: None

Command Function To replace a specified area of the previous label with new data. This command will cause the previous label to print along with any changes specified within the current data stream.

Input to Printer

```
<ESC>A
<ESC>H0025<ESC>V0020<ESC>WB0Company Name
<ESC>H0025<ESC>V0085<ESC>WB1SATO
<ESC>H0025<ESC>V0150<ESC>WL0SATO
<ESC>H0025<ESC>V0215<ESC>WL1SATO
<ESC>Q1<ESC>Z

<ESC>A
<ESC>0<ESC>H0025<ESC>V0020<ESC>WB0SATO
<ESC>Q1<ESC>Z
```

Printer Output

Special Notes

1. Specify the exact same parameters for the image to be replaced as were specified in the original data stream, including rotation, expansion, pitch, etc. This will ensure that the new data will exactly replace the old image. If the replacement data contains fewer characters than the old data, then the characters not replaced will still be printed.

2. This command will not function if the power has been cycled off and back on since the last label was printed.

3. Proportional Pitch text cannot be used with this command.

Reverse Image

Command Structure <ESC>**(aaaa,bbbb**

a = Horizontal length in dots of reverse image area
b = Vertical height in dots of reverse image area.
See Note 6 for field ranges

Example: <ESC>**(100,50**

Placement: This command must be preceded by all other data and be placed just before <ESC>Q

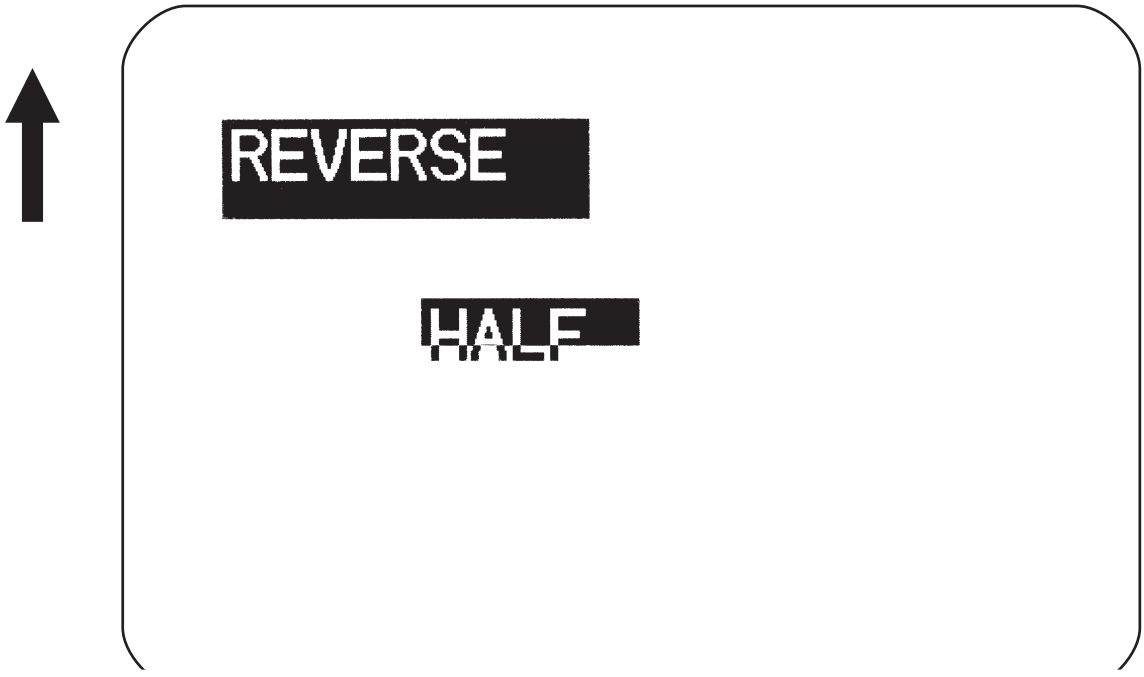
Default: None

Command Function To reverse an image area from black to white and vice versa. Use the Print Position commands (<ESC>H and <ESC>V) to locate the top left corner of the reverse image area.

Input to Printer

```
<ESC>A
<ESC>H0050<ESC>V0120<ESC>L0202<ESC>WB1REVERSE
<ESC>H0250<ESC>V0300<ES C>L0202<ESC>WB1HALF
<ESC>H0040<ESC>V0110<ESC>(370,100
<ESC>H0240<ESC>V0290<ESC>(220,47
<ESC>Q1<ESC>Z
```

Printer Output



Special Notes

1. A reverse image area is affected by the rotate commands. Therefore, always assume the printer is in the normal print orientation when designing and sending the Reverse Image command.

2. If using reverse images with the form overlay, place this command before the Form Overlay command in the data stream.

3. If the height and width to be reversed contain other than alphanumeric data, the area is not printed.

4. If the values specified exceed the maximum ranges, the reverse image is not created.

5. The maximum allowable settings are as follows:

	CL408e	**CL412e**	**CL608e**	**CL612e**
Horizontal **aaaa**	001 to 832	0001 to 1248	0001 to 1216	0001 to 1984
Vertical Default **bbbb**	0001 to 1424	0001 to 2136	0001 to 1424	0001 to 2136
Expanded **bbbb**	0001 to 9999	0001 to 9999	0001 to 9999	0001 to 9999

Rotate, Fixed Base Reference Point

Command Structure <ESC>**%a**

a = 0 Sets print to normal direction
1 Sets print to 90°CCW
2 Sets print to 180° rotated (upside down)
3 Sets print to 270° CCW

Example: <ESC>**%3**

Placement: Preceding any printed data to be rotated

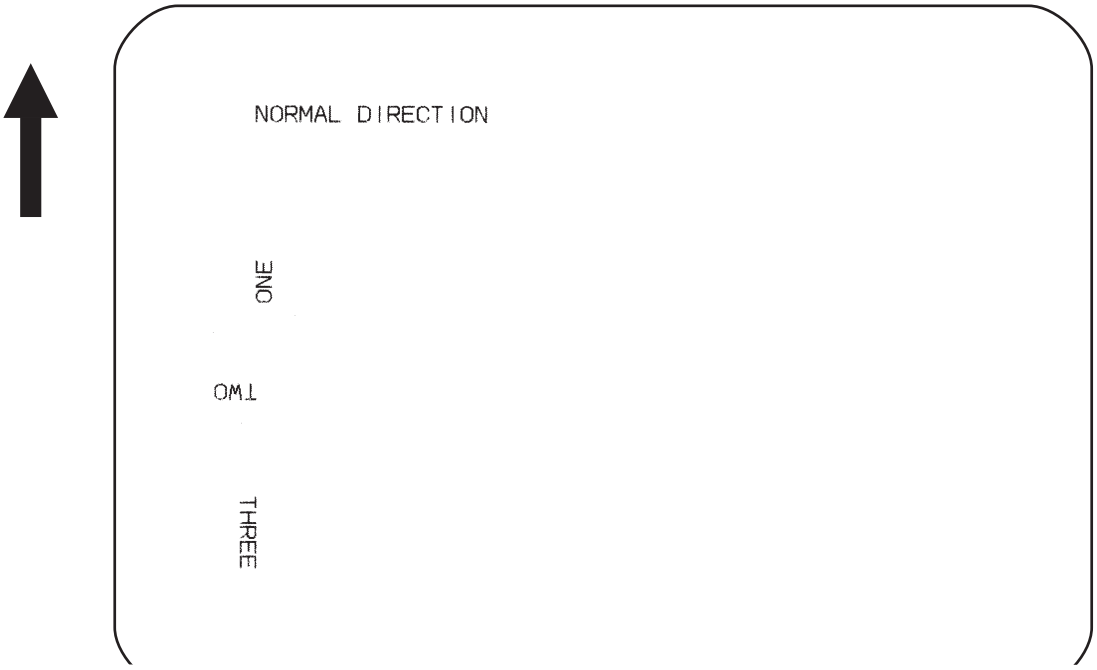
Default: <ESC>%0

Command Function To rotate the print direction in 90° increments without changing the location of the base reference point. The diagram below illustrates the use of the <ESC>% Rotate command. Note that the entire print area is shown, but your label will probably not be as large as the entire area.

Input to Printer

```
<ESC>A
<ESC>%0<ESC>L202<ESC>H0200<ESC>V0100<ESC>MNORMAL DIRECTION
<ESC>%1<ESC>H0200<ESC>V0300<ESC>MONE
<ESC>%2<ESC>H0200<ESC>V0400<ESC>MTWO
<ESC>%3<ESC H0200<ESC>V0500<ESC>MTHREE
<ESC>Q1<ESC>Z
```

Printer Output



Special Notes

1. The specified values are valid until another Rotate (<ESC>%) command is received.

2. Receipt of a Stop Print (<ESC>Z) command will reset the setting to the default value.

Sequential Numbering

Command Structure <ESC>**Faaaabcccc,dd,ee,g**

aaaa = Number of times to repeat the same data (0001-9999)

b = Plus or minus symbol (+ for increments; - for decrements)

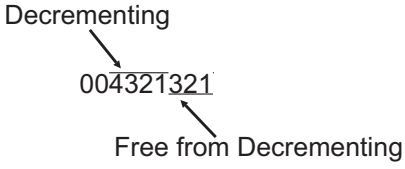
cccc = Value of step for sequence (0001-9999)

,dd = Number of digits for sequential numbering (01-99). The first incrementing character position starts after the positions exempted from sequential numbering as specified in ee. If these digits are left out, the default is 8.

,ee = Number of digits free from sequential numbering (00-99) starting with the right most position. If these digits are left out, the default is 0.

,g = Count base
1 Decimal Count
2 Hexadecimal Base

Example: <ESC>**F001-001,04,03**



In this example, the right most (least significant) three digits would not decrement and the next four would decrement.

Placement: Preceding the starting value to be incremented or decremented.

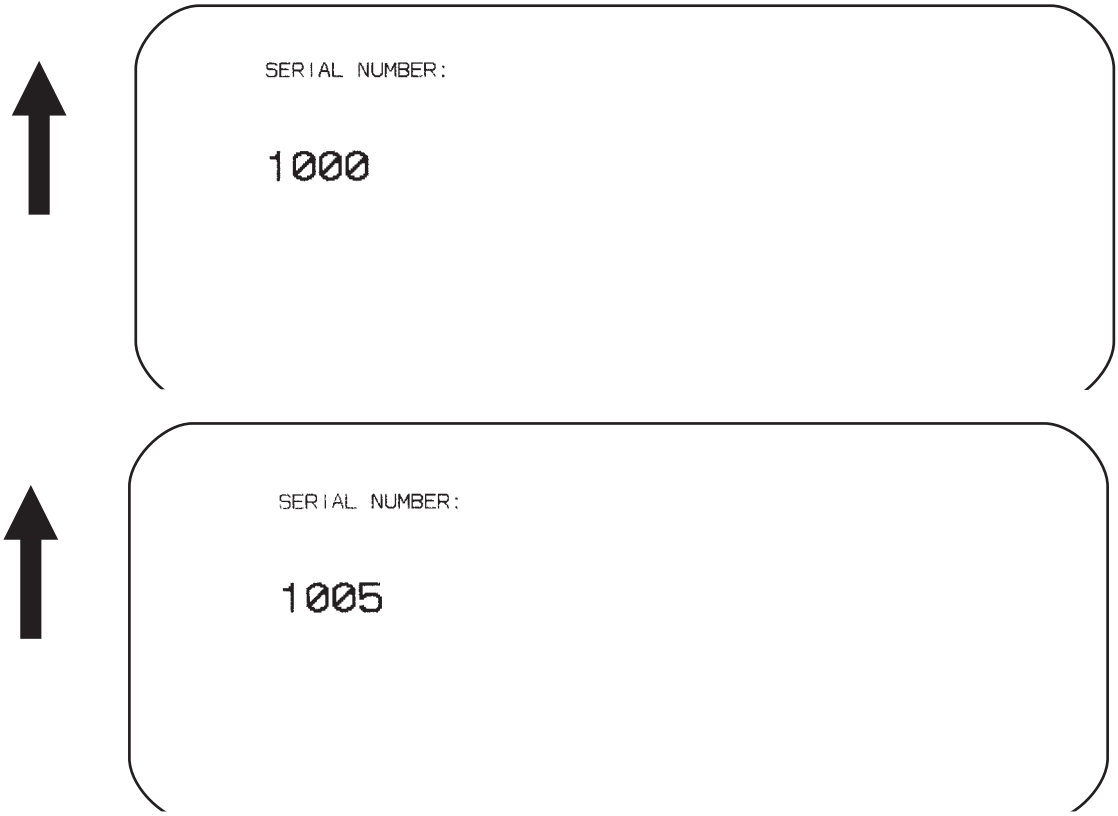
Default: None

Command Function To allow the ability to print sequential fields (text, bar codes) where all incrementing is done within the printer. Up to eight different sequential fields can be specified per label. Sequencing is effective for up to 99-digit numeric data within each field.

Input to Printer

```
<ESC>A<ESC>H0100<ESC>V0100<ESC>MSERIAL NUMBER:
<ESC>H0100<ESC>V0200<ESC>F001+005
<ESC>L0202<ESC>M1000
<ESC>Q2<ESC>Z
```

Printer Output



Special Notes

1. The value specified for Print Quantity should be equal to the number of different sequential values desired multiplied by the number of repeats specified.

Example:
To print 2 sets each of the numbers 1001-1025 on separate labels, we need 50 total labels. The commands would be as follows:

<ESC>A
<ESC>H0100<ESC>V0100<ESC>**F002+001**<ESC>XM1001
<ESC>Q50
<ESC>Z

2. It is necessary to specify the print position for each sequential field on a label.

3. Up to eight different sequential fields can be specified per label.

4. This command ignores alpha characters in the sequential number field.

5. This command can not be used with the following commands:
   Copy Image
   Reverse Image
   Line Feed

Start/Stop Label

Command Structure

Start Command: <ESC>**A**
Stop Command: <ESC>**Z**

Example: See above

Placement: <ESC>A must precede data
<ESC>Z must follow data

Default: None

Command Function

For all print jobs, the Start command must precede the data, and the Stop command must follow. The print job will not run properly if these are not in place.

Input to Printer

<ESC>**A**
<ESC>H0001<ESC>V0100<ESC>WB1SATO
<ESC>H0130<ESC>V0200<ESC>B103150*MSATO*
<ESC>H0170<ESC>V0360<ESC>L0202<ESC>S*SATO*
<ESC>Q1<ESC>**Z**

Printer Output

There is no output for these commands they are not accompanied by other label printing commands. However, these commands must precede and follow each print job sent to the printer.

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CALENDAR OPTION COMMANDS

The following commands in this section are used to control the Optional Calendar Functions. The Calendar Option must be installed in the printer before they are valid.

Calendar Increment

Command Structure <ESC>**WPabbb**

a = Y Years
M Months
D Days
h Hours
W Week Number

bbb = Numeric data: Years (0-9), Months (01-99), Days (001-999), Hours (000-999), Week (00-99)

Example: <ESC>**WPM03**

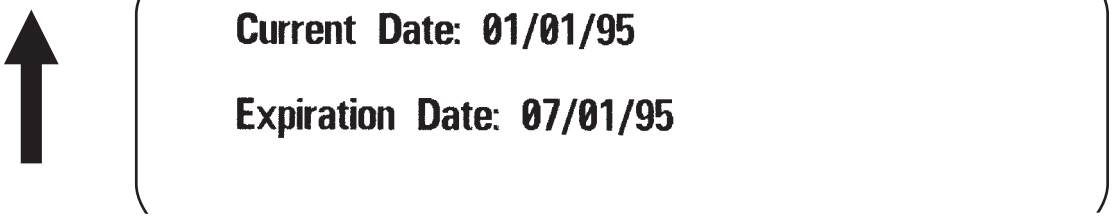
Placement: Anywhere within the data stream

Default: None

Command Function To add a value to the printer's current date and/or time, which may then be printed on the label. This command does not change the printer's internal clock setting.

Input to Printer:

```
<ESC>A
<ESC>H0100<ESC>V100<ESC>XB1Current Date:
<ESC>WAMM/DD/YY
<ESC>WPM06
<ESC>H0100<ESC>V0200<ESC>XB1Expiration Date:
<ESC>WAMM/DD/YY
<ESC>Q1<ESC>Z
```



Printer Output:

Special Notes:

1. Once the year increments past "99" it will wrap back to "00".
2. This command can only be used once per data stream.
2. The printer's internal clock may be set through the Calendar Set command.

4. If a print quantity of more than one label per job is used, the same time and date will be on each label of the entire print job.

5. Calendar Increment Example:
   1998 January 15 (ww=03) plus 48 weeks = week 51

6. The Week Calendar specification follows ISO8601. Days of the week are numbered 1 thru 7, beginning with Monday. The first week of the year is the week containing the first Thursday. If January 1st falls on Friday, it belongs to the last week of the previous year. If December 31st falls on a Wednesday, it belongs to the first week of the following year. If Calendar Increment calculation extends over the year, the result belongs to the week number of the following year.

Calendar Print

Command Structure <ESC>**WA(elements)**

(elements) =

YYYY	4 digit Year (1981-2080)
YY	2 digit Year (00-91)
MM	Month (01-12)
DD	Day (01-31)
HH	12 Hour Clock (00-11)
hh	24 Hour Clock (00-23)
mm	Minute (00-59)
ss	Seconds (00-59)
TT	AM or PM
JJJ	Julian Date (001-366)
WW	Week (00-53)
ww	Week (01-54)

Example: <ESC>**WAMM/DD/YY hh:mm**

Placement: Anywhere within the data stream

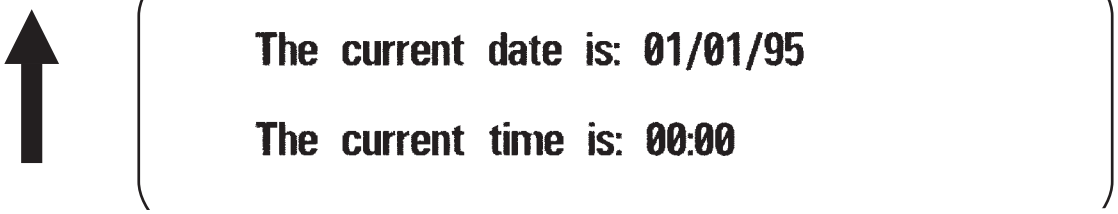
Default: None

Command Function To specify the printing of a date and/or time field from the printer's internal clock. This may be used to date/time stamp your labels.

Input to Printer:

```
<ESC>A
<ESC>H0100<ESC>V0100<ESC>XB1The current date is:
<ESC>XB1<ESC>WAMM/DD/YY
<ESC>H0100<ESC>V0200<ESC>XB1The current time is:
<ESC>XB1<ESC>WAhh:mm
<ESC>Q1<ESC>Z
```

Printer Output:



Special Notes:

1. The date and time elements may be placed in any order for printing.
2. Use a slash (/) to separate date elements and a colon (:) to separate time elements.

3. The font for the date/time elements must be specified before this command.

4. The printer's internal clock may be set through the Calendar Set command.

5. This command can be used up to six times per job.

6. The Copy (<ESC>WD), Mirror Image (<ESC>RM) or Reverse Image (<ESC>/)commands cannot be used with this command.

7. Up to 16 characters can be used with this command.

8. Century ranges are:

   For Year = YY, any year equal to or greater than 80 and less than or equal to 99, then the century equals 19

   For Year specified as YYYY=1999, and printed as <ESC>WAYY, will be equal to 99.

9. The Julian date is the accumulated day from January 1st to the current date. The first day of the year is January 1st (001) and the last day of the year is December 31st (365 or 366 for leap years).

10. The TT command should not be specified for printing in numeric only bar codes.

Calendar Set

Command Structure <ESC>**WTaabbccddee**

aa = Year (00-99)
bb = Month (01-12)
cc = Day (01-31)
dd = Hour (00-23)
ee = Minute (00-59)

Example: <ESC>**WT9101311200**

Placement: This command must be sent in an independent data stream.

Default: None

Command Function To set the time and date of the printer's internal clock.

Input to Printer:

<ESC>A
<ESC>**WT9312251300**
<ESC>Z

Printer Output There is no printer output for this command. It sets the current date to December 25, 1993 and the current time to 1:00 PM in the printer.

Special Notes

EXPANDED MEMORY OPTION COMMANDS

These commands require the optional Expanded Memory.

Note: Before Expanded Memory can be used for the first time, it must be initialized using the <ESC>BJF command. If it is not initialized, the printer will not recognize the memory and respond as if no expanded memory was installed.

Expanded Memory Function
Clear Expanded Memory

Command Structure <ESC>***a,bbb**

a = Memory card section to be cleared
- G To clear SATO graphic files from memory card
- P To clear PCX graphic files
- F To clear formats from the memory card
- O To clear TrueType fonts

bbb = Memory Card storage area to be cleared
- 001 to 999 for Graphics, PCX or Formats
- 000 to 099 for TrueType fonts

Example: <ESC>***G,01**

Placement: This command should be sent to the printer immediately following the <ESC>CC Memory Area Select command.

Default: None

Command Function To clear individual memory areas in the Expanded Memory.

Input to Printer

```
<ESC>A
<ESC>CC1<ESC>*O,09
<ESC>Z
```

Printer Output There is no printer output as a result of this command.

Special Notes

1. To clear everything in the Expanded Memory, use the <ESC>BJF Expanded Memory Initialize command.
2. This command is ignored if there is no data to be cleared.
3. This command is ignored if Expanded Memory is not installed in the printer.

Expanded Memory Function Fonts, TrueType Recall

Command Structure

<ESC>**BJRabbccddeeffffgg...g**
<ESC>**BJTaa,bb,cc,dd,ee,ffff,gg...g**

a = Font ID (0 thru 9)
aa = Font ID (00 thru 99)
bb = Horizontal Expansion (01 thru 12)
cc = Vertical Expansion (01 thru 12)
dd = Character Pitch (01 thru 99)
ee = Reserved, always 00
f f f f = Number of characters to be printed using the font
gg..g = Data to be printed

Example: **<ESC>BJR1020201000004SATO**

Placement: Immediately following the <ESC>CC Slot Select command.

Default: None

Command Function

This command recalls previously stored bit mapped TrueType fonts from Expanded Memory.

Printer Input

<ESC>A
<ESC>V0100<ESC>H0100<ESC>CC1<ESC>**BJT01,02,02,01,00,0004,SATO**
<ESC>Q1<ESC>Z

Printer Output

Special Notes

Expanded Memory Function Fonts, TrueType Store

Command Structure

Begin Download <ESC>**BJ(aa...abb..b**
Download <ESC>**BJDcccccddddee...e**
End Download <ESC>**BJ)**

aa..a = 40 byte font description
bb..b = 10 byte date information
ccccc= Memory offset (hexadecimal)
dddd = Number of data bytes to be stored (0001-2000)
ee...e= Font data to be downloaded

Example: <ESC>**BJ({50 byte header}**
<ESC>**BJD{5 byte hex memory offset}{data}**
<ESC>**BJ)**

Placement: Immediately following the <ESC>CC Slot Select command.

Default: None

Command Function

This command allows bit mapped TrueType fonts to be stored in a Expanded Memory.

Printer Input

The download data stream is very complex and it is recommended that the TrueType Download utility program be used instead of manually creating the required command and data stream.

Printer Output

There is no printer output as a result of this command. See <ESC>BJR TrueType Font Recall command.

Special Notes

1. This command requires the Expanded Memory option. See your SATO representative for details.

2. The SATO TrueType Download utility program can be used to automate the download process from a computer running Windows 3.1 or above. A copy of this utility program is included as a part of the Expanded Memory Option.

Expanded MemoryFunction Format/Field Recall

Command Structure <ESC>**YR,aa** <ESC>**/D,bb,cc...c**

aa = Format number to be recalled (01-99)
bb = Field number to be recalled (01-99)
cc...c = Data to be placed in recalled field.

Example: <ESC>**YR,01**<ESC>**/D,01,99**

Placement: Immediately after <ESC>CC Memory Area Select command

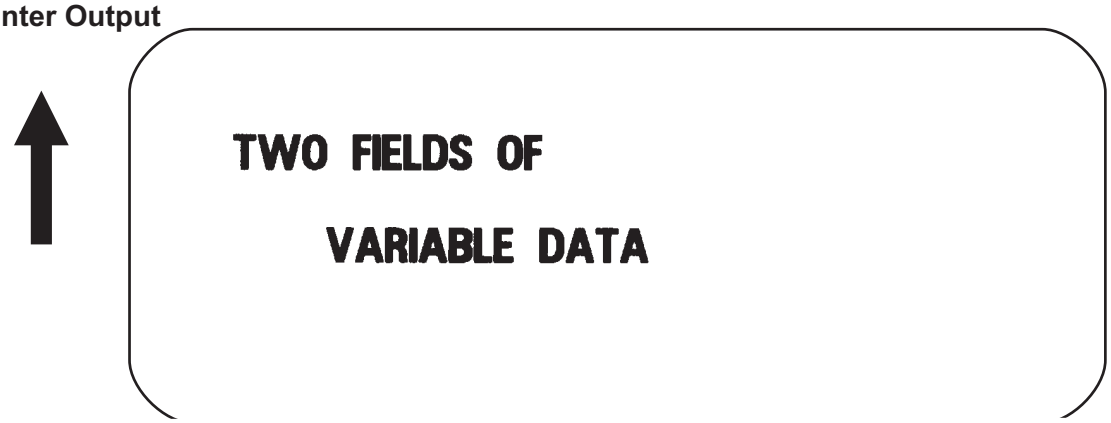
Default: None

Command Function To recall a field from a stored format and place new data in the field.

Printer Input

```
<ESC>A
<ESC>CC1
<ESC>YR,02<ESC>/D,01,TWO FIELDS OF<ESC>/D,02,VARIABLE DATA
<ESC>Q1<ESC>Z
```

Printer Output



Special Notes

1. This command requires the Expanded Memory option. See your SATO representative for details.
2. Only one format can be recalled at a time. However, multiple fields may be recalled from the same format.
3. The number of data characters contained in the “cc...c” field cannot exceed the value designated in the <ESC>/N Field Store command. If it does, the data will be truncated to fit the field length defined in the Field Store Command.

Expanded Memory Function Format/Field Store

Command Structure

<ESC>**YS,aa**<ESC>**/N,bb,cc{.....}**

aa = Format number to be stored (01-99)
bb = Field number to be stored (01-99)
cc = Length of field to be stored (01-99)
{.....} = Command stream describing the field to be stored.

Example: <ESC>**YS,01**<ESC>**/N,01,05**

Placement: Immediately after <ESC>CC Memory Area Select command.

Default: None

Command Function

To store a format field description in the memory card.

Printer Input

<ESC>A
<ESC>CC1
<ESC>**YS,02**<ESC>**/N,01,13**<ESC>V0100<ESC>H0100<ESC>XB1
<ESC>**/N,02,13**<ESC>V0200<ESC>H0200<ESC>XB1
<ESC>Z

Printer Output

There is no printer output as a result of this command. See <ESC>YR Format/Field Recall command.

Special Notes

1. This command requires the Expanded Memory option. See your SATO representative for details.

2. Each job should be sent individually. If more than one job is sent in a data stream, only the first one will be accepted and the remainder ignored.

3. The following commands cannot be stored in a format:

<ESC>CS	Print Speed	<ESC>C	Repeat Label
<ESC>NULL	Cut Label	<ESC>Q	Print Quantity
<ESC>/D	Recall Field	<ESC>EX	Expanded Label Storage
<ESC>T	Custom Characters	<ESC>&	Store Form Overlay
<ESC>@	Off Line	<ESC>#E	Print Darkness
<ESC>BJ	TrueType Fonts	<ESC>ID	Store Job ID
<ESC>G	Store Custom Graphics	<ESC>*	Clear Memory & Buffer
<ESC>BT	Variable Ratio Bar Codes	<ESC>PI	Store PCX Graphics
<ESC>0	Partial Edit		

Expanded Memory Function
Form Overlay Recall

Command Structure <ESC>**&R,aa**
aa = Storage Number (01 to 99)

Example: <ESC>**&R,01**

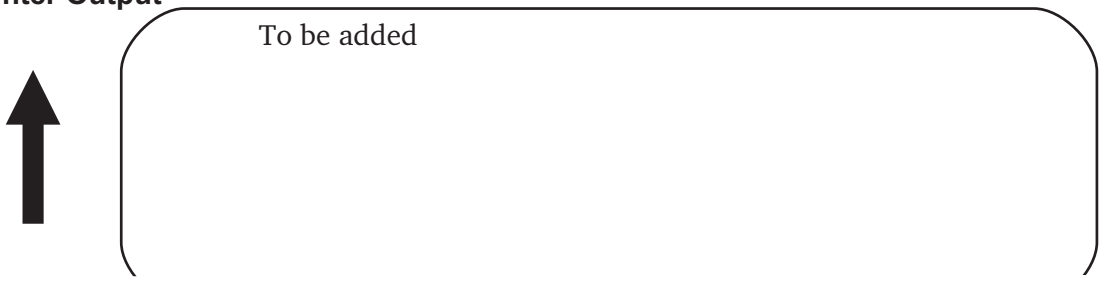
Placement: Following The <ESC>CC Memory Area Select Command

Command Function: To recall the label image from stored in the Expanded Memory.

Input to the Printer

```
<ESC>A
<ESC>CC1
<ESC>&R,01
<ESC>Q1<ESC>Z
```

Printer Output



Special Notes

1. The Expanded Memory option is required for this command. See your SATO representative for details.
2. The <ESC>CC Memory Area Select Command must be sent prior to this command.
3. Several label images stored under different Storage Numbers can be printed with this command.
4. The Storage number must be specified. A Read/Write error will occur if an unused Storage number is specified by this command.
5. The label image reference point will be V=1 H=1 if the window area has not been specified.
6. The label image can be moved by using the <ESC>V and <ESC>H commands when it is stored. aong with a window size. If it exceeds the printable area by being moved, the label image will be truncated.

9. All commands can be used with this command. However, the following commands may cause improper results if they are included in the middle of the data stream.

<ESC>A	Start Code	<ESC>&	Store Form Overlay
<ESC>Z	Stop Code	<ESC>T	Store Custom Characters
<ESC>C	Repeat Lbel	<ESC>YS	Store Format
<ESC>O	Partial Edit	<ESC>/N	Store Field
<ESC>A3	Base Reference Point	<ESC>GI	Store Custom Graphics
<ESC>CS	Print Speed	<ESC>PI	Store PCX Graphics
<ESC>#E	Print Darkness	<ESC>GT	Store BMP Graphic
<ESC>@	Offline	<ESC>TE	Store Bitmapped Font
<ESC>ID	Store Job ID	<ESC>CC	Memory Area Select
<ESC>*	Clear Print Job/Mem	<ESC>BJF	Initialize Exp. Memory
<ESC>BT	Variable Ratio Bar Codes	<ESC>EX	Expand Memory Area
<ESC>BW	Expanded Bar Codes	<ESC>~	Cutter Command

Expanded Memory Function Form Overlay Store

Command Structure

<ESC>**&S,aa,bbbb,cccc**
aa = Store Number (01 to 99)
bbbb = Horizontal size of window (50 to H max)
cccc = Vertical size of window (50 to V max)

Example: <ESC>&S,01

Placement: Following the <ESC>CC Memory Area Select Command

Default: None

Command Function

To store a label image in Expanded Memory

Printer Input

<ESC>A
<ESC>CC1
<ESC>&S,01
<ESC>Z

Printer Output

There is not printer output as a result of this command.

Special Notes

1. The <ESC>CC Memory AreaSelect command must be sent before this command.
2. The label image must be divided from other label images by the <ESC>A and <ESC>Z bounding commands.
3. The parameters of “bbbb” and “cccc” may be omitted. By specifying them, the label image can be moved by using the <ESC>V and <ESC>H position commands when recalling the label image. If the repositioned label image exceeds beyond the printable area, the image will be truncated.
4. A label image cannot be stored in a location that already contains data.
5. Graphics, PCX and BMP files can be stored with this command.
6. As many as 99 Form Overlays can be stored, however their combined storage area cannot exceed the available memory.
7. The forms stored by this command are cleared by the <ESC>*R command.

Expanded Memory Function Graphics, Custom Recall

Command Structure **<ESC>GRaaa**

aaa = Graphics storage number (001-999)

Example: <ESC>**GR111**

Placement: The Recall command is sent in a secondary data stream to print the graphic, and follows any necessary position or size commands.

Default: None

Command Function Use the Recall command any time you want to print a graphic image on a label along with other printed data.

Printer Input

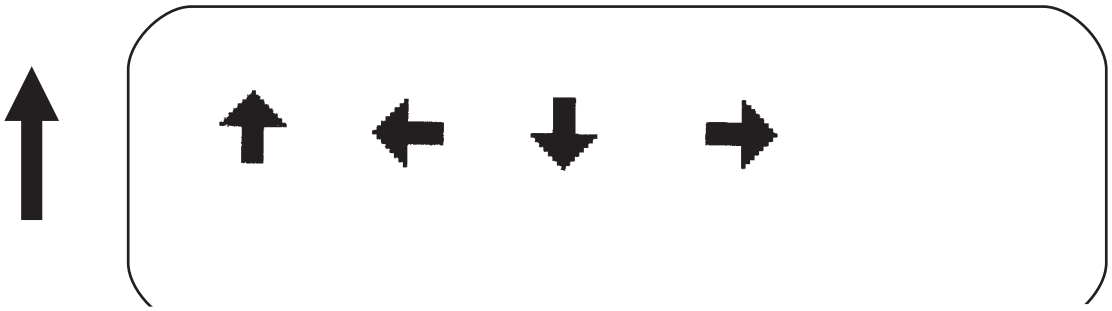
Non Rotated Graphic
<ESC>A<ESC>CC1
<ESC>V0100<ESC>H0080<ESC>L0505
<ESC>**GR001**
<ESC>Q1<ESC>Z

Graphic Rotated 90°
<ESC>A<ESC>CC1<ESC>%1
<ESC>V0180<ESC>H0250<ESC>L0505
<ESC>**GR001**
<ESC>Q1<ESC>Z

Graphic Rotated 180°
<ESC>A<ESC>CC1<ESC>%2
<ESC>V0180<ESC>H0500<ESC>L0505
<ESC>**GR001**
<ESC>Q1<ESC>Z

Graphic Rotated 270°
<ESC>A<ESC>CC1<ESC>%3
<ESC>V0100<ESC>H0700<ESC>L0505
<ESC>**GR001**
<ESC>Q1<ESC>Z

Printer Output



Special Notes

1. The graphic image to be stored cannot be rotated before it is stored. It can be rotated when it is recalled.
2. Graphic images cannot be stored as part of a label format.
3. See the <ESC>GI Custom Graphic Store command.

Expanded Memory Function Graphics, Custom Store

Command Structure

<ESC>**Glabbbcccddd{data}**

a = Specifies character format of the data
H Hex data
B Binary data
bbb = Number of horizontal 8 x 8 blocks (see Note 7 for range)
ccc = Number of vertical 8 x 8 blocks (see Note 7 for range)
ddd = Graphics storage number (001-099)
{data}= Hex or binary data to describe the graphic image

Example: See Appendix C for detailed information on creating Hex and Binary graphic files.

Placement: Immediately following the <ESC>CC Memory Area Select command.

Default: None

Command Function

To provide similar functionality to the <ESC>G Custom Graphic command, but allows for the graphic image to be stored in Expanded Memory. Use the Store command to send the graphic data to the printer, which is held in the optional Expanded Memory, even if printer power is lost.

Printer Input

<ESC>A
<ESC>CC1<ESC>**GIH002002001**
0100038007C00FE01FF03FF87FFCFFFE
07C007C007C007C007C007C007C007C0
<ESC>Z

Note: See Appendix C for detailed explanation on how to format a graphics data stream.

Printer Output

There is no printer output as a result of this command. See <ESC>GR Recall Custom Graphics command.

Special Notes

1. You must have the optional Expanded Memory to use this command. Call your SATO representative for details.

2. The maximum storage capacity is 999 graphics, up to the capacity of the memory card used.

3. If a data transmission error occurs, the printer will beep and the “ERROR” LED will come on. You must then retransmit the image.

4. Each graphic to be stored must be sent in its own data stream.

Expanded Memory Function
BMP Graphics Recall

Command Structure <ESC>**GCaaa**

aaa = Storage Number (001 to 999)

Example: <ESC>GC001

Placement: After the CC Memory Area Select command.

Default: None

Command Function To recall a previously stored BMP file stored in Expanded Memory

Printer Input

```
<ESC>A
<ESC>CC1<ESC>V100<ESC>H100
<ESC>GC001
<ESC>Q1<ESC>Z
```

Printer Output

Special Notes

1. The <ESC>CC Memory Area Select command must be sent before this command.
2. The printed image can be expanded or rotated.

Expanded Memory Function
BMP Graphics Store

Command Structure

<ESC>**GTaaa,bbbbb,nn...n**

aaa = Storage area number (001 thru 999)
bbbbb= Size of BMP file in bytes
nn..n + Data

Example: <ESC>**GT001**

Placement: This command must be placed within its own data stream specifying the placement of the graphic.

Default: None

Command Function

To recall for printing a graphic file previously stored in a BMP format in the optional Expanded Memory.

Printer Input

<ESC>A
<ESC>CC1<ESC>**GT001, 12345, nn...n**
<ESC>Q1<ESC>Z

Printer Output

There is no printer output as a result of this command.

Special Notes

1. This command requires the Expanded Memory Option. See your SATO representative for details.
2. Data must be sent in binary format.
3. The Memory Area Select Command <ESC>CCa must be sent before this command.
4. The first 62 bytes of the stored file is used for the header and the remainder is the BMP image data.
5. The graphic will not be printed correctly if the specified size does not match the actual graphic size.
6. Only black and white non-compressed BMP files can be stored. Color BMP files will cause an error.
7. If you try to store an image in a memory area that already contains data, an error will occur.

Example of correct data stream:

<ESC>A
<ESC>**GIHaaabbb001(DATA)**
<ESC>Z
<ESC>A
<ESC>**GIHaaabbb002(DATA)**
<ESC>Z

Example of incorrect data stream:

<ESC>A
<ESC>**GIHaaabbb001(DATA)**
<ESC>**GIHaaabbb002(DATA)**
<ESC>Z

5. Do not use ASCII <CR> or <LF> characters (carriage return or line feed) as line delimiters within the graphic data or the actual image will not be printed as specified.

6. The graphics storage number (ddd) must be specified with this command.

	CL408e	**CL412e**	**CL608e**	**CL612e**
Hor Blocks **bbb**	001 to 104	001 to 156	001 to 152	001 to 248
Vertical Blocks Default **ccc**	001 to 191	001 to 267	001 to 191	001 to 267
Expanded **ccc**	001 to 999	001 to 999	001 to 999	001 to 999

Expanded Memory Function Graphics, PCX Recall

Command Structure

<ESC>**PY**aaa

aa = Storage area number (001 thru 999)

Example: <ESC>**PY001**

Placement: This command must be placed within its own data stream specifying the placement of the graphic.

Default: None

Command Function

To recall for printing a graphic file previously stored in a PCX format in the Memory Card.

Printer Input

Normal Rotation
<ESC>A<ESC>CC1
<ESC>V0100<ESC>H0050<ESC>**PY001**
<ESC>Q1<ESC>Z

Rotate Base Reference Point
<ESC>A<ESC>CC1<ESC>%1
<ESC>V0330<ESC>H0160<ESC>**PY001**
<ESC>Q1<ESC>Z

2nd Rotation, Base Reference Point
<ESC>A<ESC>CC1<ESC>%2
<ESC>V0330<ESC>H0600<ESC>**PY001**
<ESC>Q1<ESC>Z

3rd Rotation, Base Reference Point
<ESC>A<ESC>CC1<ESC>%3
<ESC>V0100<ESC>H0800<ESC>**PY001**
<ESC>Q1<ESC>Z

Printer Output

Special Notes

1. This command requires Expanded Memory option. See your SATO representative for details.
2. See the <ESC>PI Store PCX Graphics command.

Expanded Memory Function Graphics, PCX Store

Command Structure

<ESC>PIaaa,bbbbb,{data}

aaa = Storage area number (001 thru 999)
bbbbb = Size of PCX file in bytes
{data} = Data

Example: <ESC>**PI001,32000,{data}**

Placement: This command must be placed within its own data stream

Default: None

Command Function

To store for later printing a PCX graphic file in the Expanded Memory.

Printer Input

BASIC Program to Download a PCX file to Expanded Memory Area #1, Storage Area #1

```
OPEN “C:\WIZARD\GRAPHICS\LION.PCX” FOR INPUT AS #2
DA$ = INPUT$(3800,#2)
C$ = CHR$(27)
WIDTH “LPT1:”,255
LPRINT C$;"A";C$;"CC1";
LPRINT C$; “PI001,03800,”;DA$
LPRINT C$;"Z";
CLOSE #2
```

Printer Output

There is no printer output as a result of this command. See <ESC>PY PCX Graphics Recall command.

Special Notes

1. This command requires Expanded Memory option. See your SATO representative for details.
2. Graphics cannot be stored as part of a format.
3. Only black and white PCX files can be stored.
4. The file size specified by this command is the DOS file size in bytes.

Expanded Memory Function Initialize

Command Structure

<ESC>**BJFaaaaaaaa**

aaaaaaa = Eight character alphanumeric user ID

Example: <ESC>BJFsatocard

Placement: Immediately following the <ESC>CC Memory Area Select command.

Default: None

Command Function

This clears all of the data from Expanded Memory in the specified memory area and prepares the area to accept data.

Input to Printer

```
<ESC>A
<ESC>CC2<ESC>BJFsatocard
<ESC>Z
```

Printer Output

There is no printer output as a result of this command.

Special Notes

1. You must have the optional Expanded Memory to use this command. Call your local SATO representative for information.
2. All Expanded Memory must be initialized before it can be used for the first time.
3. Care should be exercised when using this command as it destroys any data previously written to the card. It will clear all data from the card and assign the new ID (“satocard” in the above example).

Expanded Memory Function Memory Area Select

Command Structure

<ESC>**CCa**

a = Memory Area
- 1 Memory Area 1
- 2 Memory Area 2

Example: <ESC>**CC1**

Placement: Immediately following the <ESC>A Start Code.

Default: Last selected Memory Area.

Command Function

Selects the Memory Area to be used for following Expanded Memory commands.

Printer Input

<ESC>A
<ESC>**CC1**
{commands}
<ESC>Z

Printer Output

There is no printer output as a result of this command.

Special Notes

1. This command requires the Expanded Memory option. See your SATO representative for more information.
2. The Memory Areas specified by this command may be reversed using the LCD menu/configuration panel.
3. Unless otherwise modified via the LCD menu/configuration panel, CC1 selects the PCMCIA Expanded Memory and CC2 selects the internal Expanded Memory.

Expanded Memory Function Status

Command Structure <ESC>**BJS**

Example: **<ESC>BJS**

Placement: After the <ESC>CC Memory Area Select command.

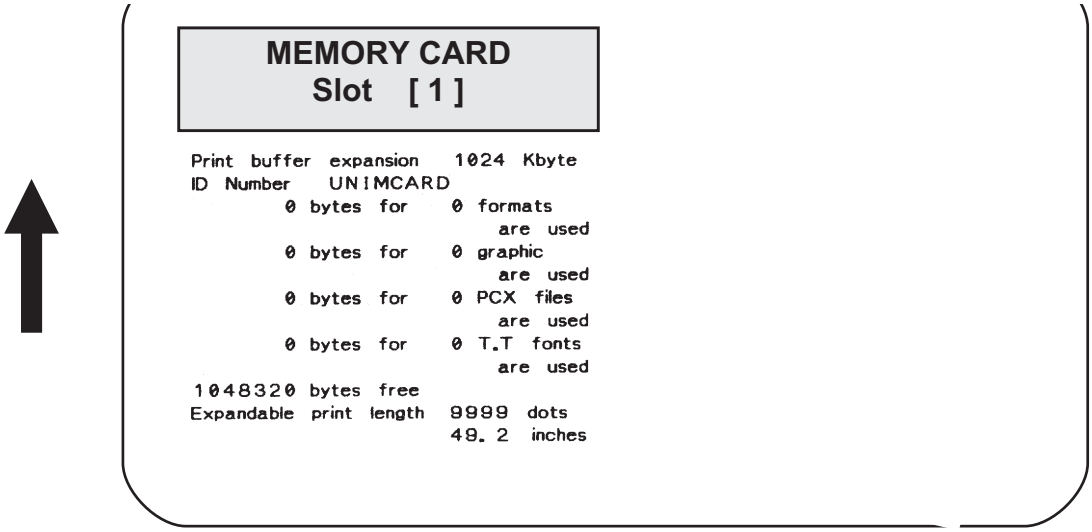
Default: None

Command Function Casues the printer to print the card status.

Printer Input

<ESC>A
<ESC>CC1<ESC>**BJS**
<ESC>Z

Printer Output



Special Notes

1. This command requires the Expanded Memory option. See your SATO representative for more information

2. The following information is provided on the status label:
   Line 1: Memory size in Kbytes
   Line 2: The ID number assigned with the <ESC>BJF command
   Line 3: Number of formats stored and bytes used
   Line 4: Number of graphics stored and bytes used
   Line 5: Number of PCX/BMP files and bytes used
   Line 6: Number of TT fonts stored and bytes used
   Line 7: Remaining free memory
   Line 8: Max expandable print length

TWO-DIMENSIONAL SYMBOLS

The following commands are used to create the two-dimensional symbologies supported by the printers.

Two-Dimensional Bar Codes
Data Matrix, Data Format

Command Structure

<ESC>**BXaabbccddeeefffghh**

aa = Format ID. 01-06 or 11-16. The values 07 and 17 will not be accepted by the printer.
bb = Error correction level. 00 ,05, 08, 10, 14 or 20 or 200. All other values will be processed as a 00.
cc = Horizontal cell size. 03 - 12 dots/cell.
dd = Vertical cell size. 03 - 12 dots/cell.
eee = Number of cells in one line. Must use 000 to optimize.
fff = Number of cell lines. Must use 000 to optimize.
g = Mirror Image
  0 = Normal Print
  1 = Reverse Print
hh = Guide Cell Thickness. 01-15. 01 indicates normal type.

Example: <ESC>**BX03080505000000001**

Placement: Immediately preceding data to be encoded

Default: None

Command Function

To designate the format for a Data Matrix two-dimensional bar code image on a label.

Printer Input

<ESC>A
<ESC>%0<ESC>V0100<ESC>H0100<ESC>**BX05051010000000001**
<ESC>DCDATA MATRIX DATA MATRIX
<ESC>Q1<ESC>Z

Printer Output

There is no printer output as a result of this command. See the <ESC>DC Print Data command for printer output.

Special Notes

1. If any of the parameters entered are outside the valid range, a symbol will not be printed when the <ESC>DC Print Data command is sent to the printer.

2. The number of cells per line (eee) and the number of cell lines (fff) should be specified as all zeroes, allowing the printer to automatically calculate the optimum configuration for the symbol.

3. The Reference Point for the Data Matrix symbol is the upper-left corner.

4. The Format ID specified for “aa” is defined by the following table. The printer only supports the Format ID’s defined in the table.

ECC Level (bb)	Format ID (aa)					
	01	**02**	**03**	**04**	**05**	**06**
00 (ECC000)	500	452	394	413	310	271
05 (ECC050)	457	333	291	305	228	200
08 (ECC080)	402	293	256	268	201	176
10 (ECC100)	300	218	190	200	150	131
14 (ECC140)	144	105	91	96	72	83
20 (ECC200)	Numeric				3116	
	Alphanumeric				2336	
	ISO 8-bit (01_H - FF_H)				1556	

5. The character set or each Format ID is:

ID NUMBER	CHARACTER SET	ENCODING SCHEME
16 Bit CRC		
01	Numeric, Space	Base 11
02	Upper Case Alpha, Space	Base 27
03	Upper Case Alpha, Space,Comma, Period, Slash, Minus	Base 41
04	Upper Case Alphanumeric, Space	Base 37
05	ASCII 7-bit, Full Keyboard (20_H -$7F_H$)	ASCII
06	ISO 8-bit, International (20_H -FF_H)	8-Bit

Two-Dimensional Bar Codes
Data Matrix, Print Data

Command Structure <ESC>**DCxx...x**

xx...x = Data, maximum of 500 characters

Example: <ESC>**DC00006000**

Placement: Immediately following the <ESC>BC Data Format designation command or the <ESC>FX Sequential Numbering command.

Default: None

Command Function To print a Data Matrix two-dimensional bar code image on a label.

Printer Input

<ESC>A
<ESC>%0<ESC>V0100<ESC>H0100<ESC>BX05051010000000001
<ESC>**DCDATA MATRIX DATA MATRIX**
<ESC>Q1<ESC>Z

Printer Output

Special Notes

1. The maximum amount of data that can be printed with this command is 500 characters.

2. If an <ESC>BX Data Format designation command contains any parameters out of the valid range, no symbol will be printed when this command is sent.

Two-Dimensional Bar Codes
Data Matrix, Sequential Numbering

Command Structure **<ESC>FXaaabcccdddeee**

aaa = Number of duplicate labels to be printed (001 -999)
b = Increment or Decrement
+ = Increment
- = Decrement
ccc = Increment/Decrement Steps (001 - 999)
ddd = Sequential numbering start position (001 - 999) Referenced to left side.
eee = Incremented data length measured from start position (001 - 999)

Placement: Immediately following the <ESC>BX Data Format designation command and preceding the <ESC>DC Print Data Command.

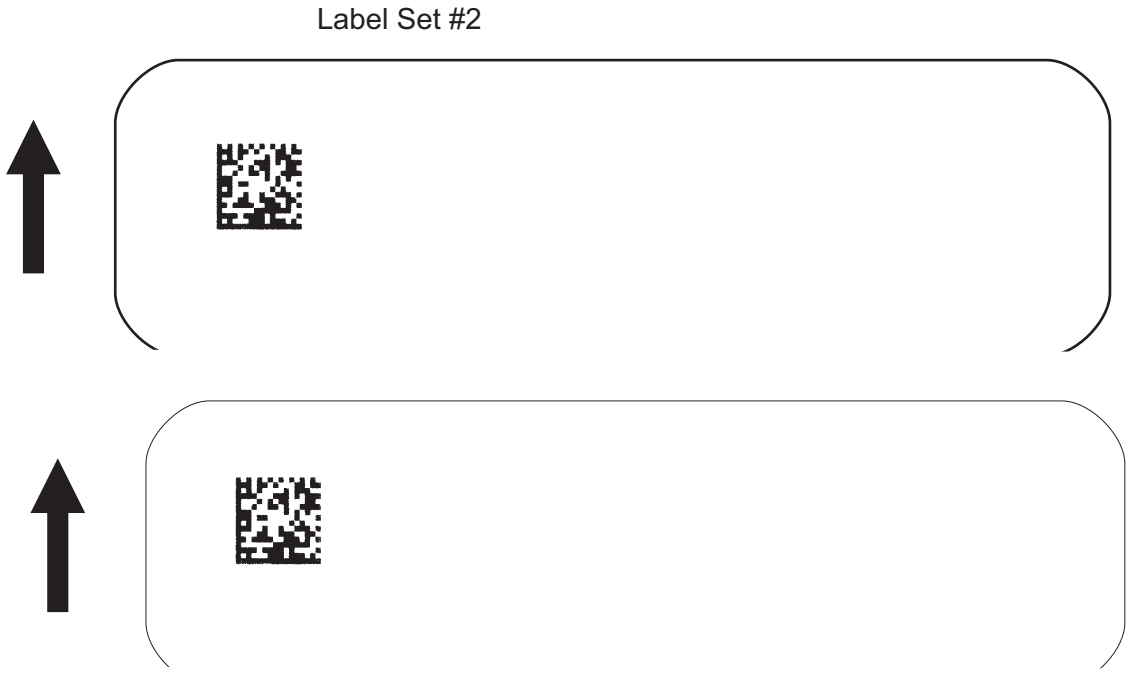
Default: None

Command Function To print sequential numbered Data Matrix symbols.

Printer Input

```
<ESC>A
<ESC>V0100<ESC>H0100
<ESC>BX03081010000000001
<ESC>FX002+001005003<ESC>DC000060000
<ESC>Q4<E SC>Z
```

Printer Output Label Set #1



Special Notes

1. The maximum number of <ESC>FX Sequential Numbering commands that can be used in one job is eight.

2. In the example above four total labels will be printed (<ESC>FX002+005003<ESC>DC00006000), the sequential numbering will start at position 5 and the three digits “600” will be incremented in steps of 1. A total of two sets of labels will be printed, the first set of two labels with the value “00006000” and the next two label set with the value “00006010”.

	Label Set #1		Label Set #2
1st Label	00006000	3rd Label	00006010
2nd Label	00006000	4th Label	00006010

3. The <ESC>Q Label Quantity command must be set for the total number of labels to be printed. In the above example, the value for the <ESC>Q command should be 2 sets x 2 labels/set = 4. If, in the above example, it was set to a value of “1”, only the first label would be printed.

Two-Dimensional Bar Codes
Maxicode

Command Structure <ESC>**BVa,b,c,ddddddddd,eee,fff,gggg.....<ESC>**

a = Position of Maxicode symbol within the set, when used in a structured append format 1~8.
b = Total number of Maxicode symbols in the set, when used in a structured format 1~8.
c = 2 For Mode 2 Structured Carrier Message for Domestic U.S. UPS shipments
3 For Mode 3 Structured Carrier Message for International UPS shipments
4 Standard symbol
5 Not currently supported
6 Reader programming
ddd..ddd 9 digit numeric Postal Code
eee = 3 digit numeric Country Code
fff = 3 digit numeric Service Class
gg..g = Data, terminated by <ESC>

Example: <ESC>**BV1,2,3,123456789,222,333,MESSAGE<ESC>**

Placement: Immediately preceding data to be encoded

Default: None

Command Function To print a Maxicode two-dimensional bar code image on a label. See Appendix B for specific information on using each individual bar code symbol.

Command Function To print a UPS Maxicode symbol.

<ESC>A<ESC>V0100<ESC>H0100
<ESC>**BV1,1,2,123456789,840,001,[)<RS>01<GS>961Z01547089<GS>UPSN<GS>056872<GS>349<GS>99999999<GS>001/005<GS>029<GS>N<GS><GS>LENEXA<GS>KS<RS><EOT>**
<ESC>Q001<ESC>Z

Printer Output

Special Notes

1. <Rs> represents Hex 1E, <Gs> represents Hex 1D, <Eot> represents Hex 04, <ESC> represents Hex 1B and <Sp> represents Hex 20.

Two-Dimensional Bar Codes
PDF417

Command Structure <ESC>**BK**aabbcddeeffffnn...n,g

aa = Minimum module dimension (03-09 dots). Will not print if values of 01, 02 or greater than 10 are specified.
bb = Minimum module pitch dimension (04-24 dots). Will not print if values of 01, 02, 03 or greater than 25 are specified.
c = Security (error detection) Level (1-8).
dd = Code words per line (01-30). If 00 is specified for both dd and ee, the printer automatically optimizes the number of rows per symbol.
ee = Rows per symbol (00 or 03-40). If 00 is specified for both dd and ee, the printer automatically optimizes the number of rows per symbol.
ffff = Number of characters to be encoded (0001-2700).
nn...n = Data to be printed.
g = PDF417 type. If not specified, standard PDF417
T Truncated PDF417
M Micro PDF417

Example: <ESC>BK0304400000021

Placement: Immediately preceding data to be encoded

Default: None

Command Function To print a PDF417 two-dimensional bar code image on a label.

Printer Input

<ESC>A
<ESC>V0100<ESC>H0100<ESC>**BK0607400000021PDF417 PDF417 PDF417**
<ESC>Q1<ESC>Z

Printer Output

Special Notes

1. When the code words per line and the number of rows per symbol (“dd” and“ee”) are set to all zeroes, the printer will calculate the optimum configuration.

2. If the product of the values entered for “dd” and “ee” are not equal to or less than the value of “fff” (i.e.,“ffff” is greater that “dd” x “ee”), an error will occur and the symbol will not be printed. It is recommended that these values each be set to “000” and the printer be allowed to automatically calculate the optimum values.

3. The values for “dd” and “ee” need to be made larger if the security level is increased.

4. The maximum data length is 2700 characters, but may be less depending upon:
   - the minimum module dimension (“aa”)
   - the security level specified by “c”.
   - the number of data characters

5. The Reference Point of the PDF417 symbol is the upper-left corner.

6. The <ESC>F Sequential Numbering command cannot be used with this command.

7. The <ESC>E Line Feed command cannot be used with this command.

8. The values 00_H thru $1F_H$ can be specified as print data.

9. This command can be stored in a format.

10. The print height of the symbol will vary depending upon the data specified; numeric only, alpha only or alphanumeric.

CONFIGURATION COMMANDS

These commands are used to change to operating configuration of the printer.

Custom Protocol Command Codes Download

Command Structure <ESC>**LD,a,b,c,d,e,f,g,h,i,j j**

a = Replacement character for STX in ASCII or hex format
b = Replacement character for ETX in ASCII or hex format
c = Replacement character for ESC in ASCII or hex format
d = Replacement character for ENQ in ASCII or hex format
e = Replacement character for CAN in ASCII or hex format
f = Replacement character for NULL in ASCII or hex format
g = Replacement character for Offline in ASCII or hex format
h = Auto-Online. Printer powers up in the On Line mode.
0 = Yes
1 = No
i = Zero Slash. Places a slash through the “0” character.
0 = Yes
1 = No
j j = Hexadecimal code for Eurocharacter

Example: **<ESC>LD,{,},%,#,&,*,~,0,0,D5**

Placement: Immediately following the <ESC>A Start command and in an independent data stream.

Default: Standard Protocol command Codes

Command Function Allows the user to defines custom Protocol Command codes.

Printer Input

<ESC>A
<ESC>**LD,{,},%,#,&,*,~,0,0,D5**
<ESC>Z

Printer Output A Protocol Command code status label will be printed as a result of the a successful download of a custom set of Protocol Command codes.

STX = 7B ETX = 7D ESC = 25
ENQ = 23 CAN = 26 NULL = 2A
OFFLINE = 7E
AUTO ONLINE = YES
ZERO SLASH = YES

Press the “FEED” key to activate the User Default or power the printer off to ignore them.

Special Notes

1. Commas must be used to separate the parameters. If a parameter is omitted between two commas, the default Non-Standard Protocol Command codes for that parameter will be used. See Appendix E.

2. This command must be sent as an independent data stream immediately following the <ESC>A Start code and immediately preceding the <ESC>Z Stop code. No other commands can be included in the data stream.

3. If more or less than nine commas are included in the command, the entire command sequence will be ignored. The command must contain exactly nine commas.

4. If two characters are specified for a parameter, it will be interpreted as a hex value. For example:

Command Parameter	Resulting Command Code
2B	+
+	+

   If a combination of characters are outside the hexadecimal range, the entire command sequence will be ignored.

5. Downloading Auto Online and Zero Slash settings will overwrite the values selected using the LCD panel. If these settings are changed using the LCD panel, they will overwrite any previously downloaded settings.

Printer Setting

Command Structure <ESC>**PCaa,a,b,c,d,e,f,g,h,h,i,j,k,l,m,n,o,p,q,r,s,t,u,v,w,x,y,z**
<ESC>**PCaa,bb**

aa = Setting to be changed (01 to 26). Only revelant setting can be changed. To change multiple settings, must be set to “F”.

SETTING (ASCII)	COMMAND PARAMETER	ASCII VALUE	DESCRIPTION
01	a	0	Reserved
02	b	0	Reserved
03	c	0	Print Speed, 2 ips (50 mm/s)
03		1	Print Speed, 3 ips (75 mm/s)
03		2	Print Speed, 4 ips (100 mm/s)
03		3	Print Speed, 5 ips (125 mm/s)
03		4	Print Speed, 6 ips (150 mm/s)
03		5	Print Speed, 8 ips (200 mm/s)
03		6	Print Speed, 10 ips (250 mm/s)
04	d	0	Reserved
05	e	0	Cutter Mode, Backfeed after print
05		1	Cutter Mode, Backfeed before print
05		2	Cutter Mode, no Backfeed
06	f	0	Dispense Mode, Backfeed after print
06		1	Dispense Mode, Backfeed before print
07	g	0	Reserved
08	h	A	Print Darkness Range A
08		B	Print Darkness Range B
08		C	Print Darkness Range C
08		D	Print Darkness Range D
08		E	Print Darkness Range E
08		F	Print Darkness Range F
09	i	1	Print Darkness Level 1
09		2	Print Darkness Level 2
09		3	Print Darkness Level 3

SETTING (ASCII)	COMMAND PARAMETER	ASCII VALUE	DESCRIPTION
09		4	Print Darkness Level 4
09		5	Print Darkness Level 5
10	j	0	Reflective (Eye-Mark) Sensor
10		1	Transmissive (Gap) Sensor
10		2	Sensors Disabled
11	k	0	Zero Slash disabled
11		1	Zero Slash enabled
12	l	0	Reserved
13	m	0	Paper Type, Labels
13		1	Paper Type, Fan-Fold
14	n	0	Autofeed disabled
14		1	Autofeed enabled
15	o	0	Pitch Fixed
15		1	Pitch Proportional
16	p	0000 to 9999	Vertical Label Size (0 to Vmax dots)
17	q	000 to Hmax	Horizontal Label Size (0 to Hmax dots)
18	r	000 to 792 -001 to -792	Vertical Offset (0 to 792 dots) Vertical Offset (-1 to -792 dots)
19	s	000 to 792 -001 to -792	Horizontal Offset (0 to 792 dots) Horizontal Offset (-1 to -792 dots)
20	t	00 to 99	Pitch Offset (0 to 99 dots)
21	u	00 to 99 -01 to -99	Tear Off Offset (0 to 99 dots) Tear Off Offset (-1 to -99 dots)
22	v	00 to 99 -01 to -99	Cut Offset (0 to 99 dots) Cut Offset (-1 to -99 dots)
23	w	00 to 99 -01 to -99	DispenseOffset (0 to 99 dots) Dispense Offset (-1 to -99 dots)
24	x	0	Reserved
25	y	0 to 64	Gap Size (0 to 64 dots)
26	z	0	Buzzer Enabled
26		1	Buzzer Disabled

Placement: Separate data stream sent to printer

Default: None

Command Function To set the printer default configuration into EEPROM

Input to Printer

<ESC>A
<ESC>**PC26,0**
<ESC>Z

Printer Output

There is no printer output as a result of this command. This command enables the buzzer.

Special Notes

1. All command setting values must be in ASCII format.

2. These settings are stored in EEPROM and will remain valid until receipt of another <ESC>PC command.

3. All positions in this command must be separated by a comma. If the parameter. To change multiple settings, the correct number of commas must be placed in the command, i.e. to change the label gap sensor to reflective (eye-mark), the command would be:

   <ESC>PC, , , , , , , , ,0, , , , , , , , , , , , , , , , , , .

4. If only one setting is to be changed, the “aa” parameter must be an “F”.

Print Mode

Command Structure <ESC>**PMa**

a = 0 Continuous
1 Tear-Off
2 Cut, Backfeed after print
3 Cut, Backfeed before print
4 Cut, no Backfeed
5 Reserved
6 Reserved
7 Dispense, Backfeed after print
8 Dispense, Backfeed before print

Example: See above

Placement: Separate data stream sent to printer

Default: Default value set by <ESC>PC command

Command Function To set the print mode for a job.

Input to Printer

```
<ESC>A
<ESC>PM1
<ESC>Z
```

Printer Output There is no printer output as a result of this command.

Special Notes

1. When power is cycled, the value set by this command is lost and replaced by the default value stored in the EEPROM.

2. To change the value stored in the EEPROM, use the <ESC>PC Printer Setting command or use the Printer Setting Utility program contained on the CDROM shipped with the printer.

Print Type

Command Structure <ESC>**PHa**

a = 0 Thermal Transfer printing
1 Direct Thermal Printing

Example: See above

Placement: Separate data stream sent to printer

Default: Default value set by <ESC>PC command.

Command Function To set the printing method used for a job

Input to Printer

```
<ESC>A
<ESC>PH1
<ESC>Z
```

Printer Output There is no printer output as a result of this command.

Special Notes

1. When power is cycled, the value set by this command is lost and replaced by the default value stored in the EEPROM.
2. To change the value stored in the EEPROM, use the <ESC>PC Printer Setting command or use the Printer Setting Utility program contained on the CDROM shipped with the printer.
3. This value can also be set by DSW2-1.

Sensor Type

Command Structure <ESC>**IGa**

a = 0 Reflective (Eye Mark) sensor
1 See-thru (transmissive) sensor
2 Sensor not used

Example: See above

Placement: Separate data stream sent to printer

Default: Default value set by <ESC>PG command

Command Function To select the label sensing method for a job.

Input to Printer

```
<ESC>A
<ESC>IG1
<ESC>Z
```

Printer Output There is no printer output as a result of this command

Special Notes

1. When power is cycled, the value set by this command is lost and replaced by the default value stored in the EEPROM.

2. To change the value stored in the EEPROM, use the <ESC>PG Printer Setting command or use the Printer Setting Utility program contained on the CDROM shipped with the printer.

Serial Interface Parameters

Command Structure <ESC>**I2abcde**

a	=	0	Baud rate, 9600 bps
		1	Baud Rate, 19200 bps
		2	Baud Rate, 38400 bps
		3	Baud Rate, 57600 bps
b	=	0	8 Data bits
		1	7 Data Bits
c	=	0	No Parity
		1	Odd Parity
		2	Even Parity
d	=	0	1 Stop Bit
		1	2 Stop Bits
e	=	0	Single Item Buffer
		1	Multi Item Buffer
		2	X-On/X-Off Flow Control
		3	Bi-Com 4
		4	Bi-Com 3

Example: See above

Placement: Separate data stream sent to printer

Default: Default value set by <ESC>PG command

Command Function To set the operating parameters of the RS232 Inferface for a job.

Input to Printer

```
<ESC>
<ESC>I230011
<ESC>Z
```

Printer Output There is no printer output as a result of this command.

Special Notes

1. The setting are stored in the EEPROM by this command and they will remain in effect until a new <ESC>I2 command is received. Cycling power will have no effect on these settings.

2. To change the value stored in the EEPROM, use the <ESC>PG Printer Setting command or use the Printer Setting Utility program contained on the CDROM shipped with the printer.

3. All command parameters must be present in the data stream sent to the printer.

4. Selecting X-On/X-Off, Bi-Com 3 or Bi-Com 4 will automatically place the printer in the Multi Buffer mode.

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SECTION 6.
INTERFACE SPECIFICATIONS

INTRODUCTION

TheCL Series "e" printers utilize a Plug-In Interface Module for maximum printer configuration flexibility. This section presents the interface specifications for the CL Series "e" Series printers. These specifications include detailed information on how to properly interface your printer with your host system.

The following information is presented in this section:

- Interface Types
- Using the Receive Buffer
- IEEE1284 Parallel Interface
- Universal Serial Bus (USB) Interface
- Local Area Network (LAN) Interface
- RS232C Serial Interface
  - General Specifications
  - Electrical Specifications
  - Pin Assignments
  - Ready/Busy Flow Control
  - X-On/X-Off Flow Control
  - Bi-Directional Communications Protocol
- Bi-Comm Communications Protocol
- Status Response

INTERFACE TYPES

The parallel interface for the CL Series "e" printers is a high speed, bi-directional interface that conforms to the IEEE1284 specification (ECP mode on some computers). The interface is also compatible with the older Centronics parallel interface standard. If it does not detect the correct IEEE1284 signals in the interface connection, it will automatically operate in the standard Centronics mode which is much slower. To use the IEEE1284 parallel interface to its fullest capability requires that the host also have an IEEE1284 compatible interface and that the two be connected with a cable that meets the IEEE1284 specification. If either of these two are not present, the data rate is severely compromised.

In order to provide flexibility in communicating with a variety of host computer systems all "e" printers use a Plug-In Interface Module. The IEEE1284 Interface module is shipped with the printer unless another interface type is specified at the time of the order. The other interfaces available are a high speed (to 57.6K bps) serial interface, an Ethernet interface or an optional Universal Serial Bus (USB) interface.

The Parallel interface will probably be the most useful in communicating with IBM PCs and compatibles. The RS232C Serial interface allows connectivity to a number of other hosts. The USB interface allows the printer to be connected to a computer that

supports peripherals attached to a USB bus. Up to 127 peripherals can be connected to a single USB port.

WARNING: Never connect or disconnect interface cables (or use a switch box) with power applied to either the host or the printer. This may cause damage to the interface circuitry in the printer/host and is not covered by warranty.

To be added

THE RECEIVE BUFFER

The CL Series “e” printers have the ability to receive a data stream from the host in one of two ways. The receive buffer may be configured to accept one print job at a time or multiple print jobs. The single job print buffer is generally used by software programs that wish to maintain control of the job print queue so that it can move a high priority job in front of ones of lesser importance. The multiple job buffer, on the other hand prints all jobs in the order they are received by the printer, and the order of printing cannot be changed.

Single Job Buffer

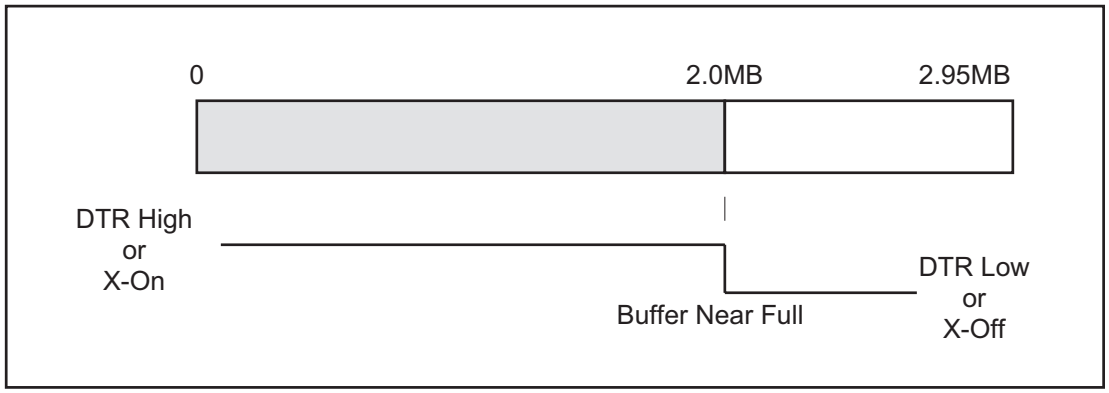
The printer receives and prints one job at a time. Each job must not exceed 2.95MB.

Multi Job Buffer

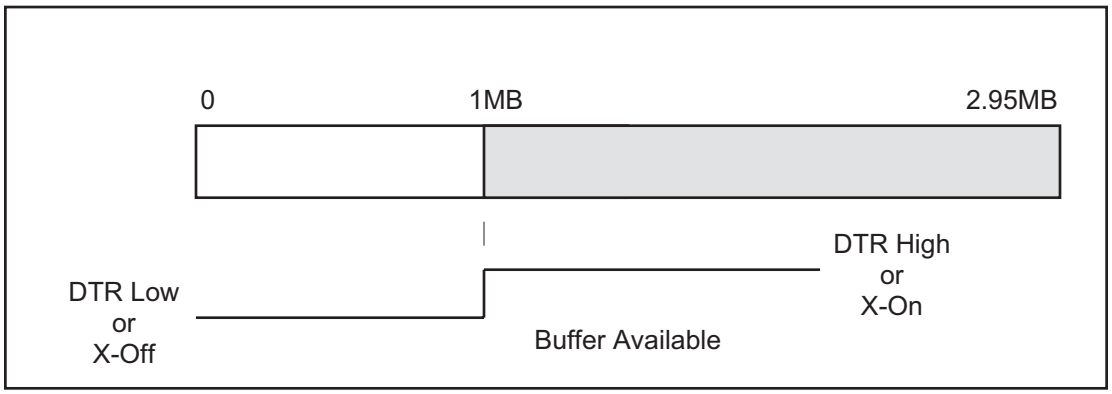
The printer is able to continuously receive print jobs, compiling and printing other jobs at the same time. It acts much like a “print buffer” to maximize the performance of the host and the printer.

When using the RS232 Serial interface, the Multi Job Buffer uses either the **Ready/Busy** with **DTR** (pin 20) or **X-On/X-Off** flow control protocols. See these sections for more details. With an empty receiving buffer, the status of **DTR** is “high” (or an **X-On** status if using **X-On/X-Off**), meaning the printer is ready to receive data. When the receive buffer is holding 2.0MB of data (1MB from being full), **DTR**

will go "low" (or an **X-Off** is sent) indicating the printer can no longer receive data. This condition is called "Buffer Near Full."



The receiving buffer will not be able to receive more data again until a "Buffer Available" condition occurs. This takes place when the receiving buffer has emptied so that only 1MB bytes of data are being held (2.0MB bytes from being full). At this time, **DTR** will go "high" or an **X-On** is sent to tell the host that it can again receive data.



All printer error conditions (i.e., label out, ribbon out) will cause the printer to go busy (**DTR** "low" or **X-Off**) until the problem is corrected and the printer is placed on-line. The printer will also be busy if taken off-line from the front panel.

IEEE1284 PARALLEL INTERFACE

The parallel interface for the CL Series "e" printers is a Plug-In Interface Module that can be installed by the user. It conforms to the IEEE1284 specification. It will automatically detect the IEEE1284 signals and operate in the high speed mode. If it does not detect the IEEE1284 signals, it will operate in the standard Centronics mode, which is significantly slower. *For this reason, an interface cable and host interface conforming to the IEEE1284 specification must be present to fully utilize the speed capabilities.* This interface also operates bi-directionally and can report the status of the printer back to the host.

ELECTRICAL SPECIFICATIONS

Printer Connector AMP 57-40360 (DDK) or equivalent

Cable Connector AMP 57-30360 (DDK) or equivalent

Cable IEEE1284 Parallel, 10 ft. (3 m) or less

Signal Level High = +2.4V to +5.0V
Low = 0V to -0.4V

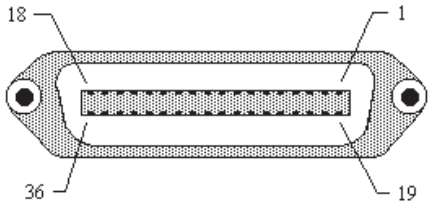
DATA STREAMS

<ESC>A . . Job#1 . . <ESC>Z<ESC>A . . Job#n . . <ESC>Z

IEEE1284 Parallel Interface Pin Assignments

PIN	SIGNAL	DIRECTION	PIN	SIGNAL	DIRECTION
1	$\overline{\text{STROBE}}$	To Printer	19	STROBE Return	Reference
2	DATA 1	To Printer	20	DATA 1 Return	Reference
3	DATA 2	To Printer	21	DATA 2 Return	Reference
4	DATA 3	To Printer	22	DATA 3 Return	Reference
5	DATA 4	To Printer	23	DATA 4 Return	Reference
6	DATA 5	To Printer	24	DATA 5 Return	Reference
7	DATA 6	To Printer	25	DATA 6 Return	Reference
8	DATA 7	To Printer	26	DATA 7 Return	Reference
9	DATA 8	To Printer	27	DATA 8 Return	Reference
10	$\overline{\text{ACK}}$	To Host	28	ACK Return	Reference
11	BUSY	To Host	29	BUSY Return	Reference
12	PTR ERROR	To Host	30	PE Return	Reference
13	SELECT	To Host	31	$\overline{\text{INIT}}$	From Host
14	$\overline{\text{AUTOFD}}$ (1)	To Host	32	$\overline{\text{FAULT}}$	To Host
15	Not Used		33	Not Used	
16	Logic Gnd		34	Not Used	
17	FG	Frame Ground	35	Not Used	
18	+5V (Z=24K ohm)	To Host	36	$\overline{\text{SELECTIN}}$ (1)	From Host

(1) Signals required for IEEE1284 mode.



OPTIONAL RS232C SERIAL INTERFACE

The High Speed Serial Interface is a Plug-In Interface Module that can be installed in the printer by the user.

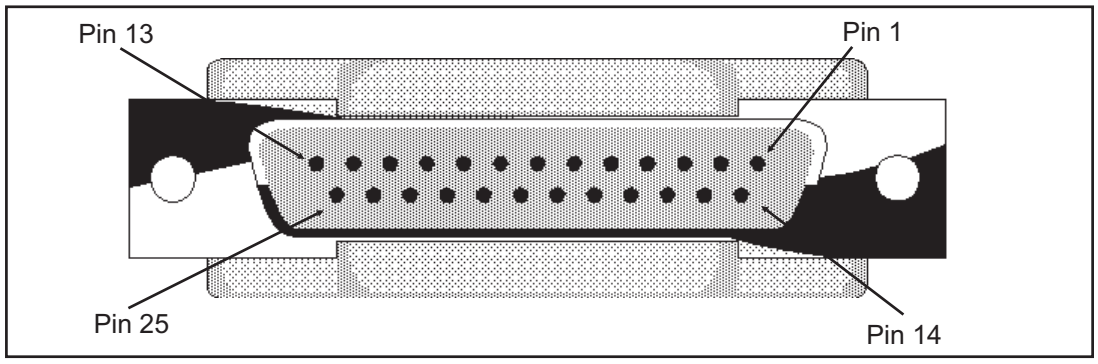
GENERAL SPECIFICATIONS

Asynchronous ASCII	Half-duplex communication
	Ready/Busy Hardware Flow Control Pin 20, DTR Control Pin 4, RTS Error Condition
	X-On/X-Off Software Flow Control
	Bi-Directional Communication
Data Transmission Rate	9600, 19200, 38400, 57600 bps
Character Format	1 Start Bit (fixed) 7 or 8 data bits (selectable) Odd, Even or No Parity (selectable) 1 or 2 Stop bits (selectable)

ELECTRICAL SPECIFICATIONS

Connector	DB-25S (Female)
Cable	DB-25P (Male), 50 ft. maximum length. For cable configuration, refer to Cable Requirements appropriate to the RS232C protocol chosen.
Signal Levels	High = +5V to +12V Low = -5V to -12V

PIN ASSIGNMENTS



RS232C Interface Signals

PIN	DIRECTION	SIGNAL DEFINITION
1	Reference	FG (Frame Ground)
2	To Host	TD (Transmit Data) - Data from the printer to the host computer. Sends X-On/X-Off characters or status data (Bi-Directional protocols).
3	To Printer	RD (Receive Data) - Data to the printer from the host computer.
4	To Host	RTS (Request to Send) - Used with Ready/Busy flow control to indicate an error condition. RTS is high and remains high unless the print head is open (in this case, RTS would return to the high state after the print head is closed and the printer is placed back on-line) or an error condition occurs during printing (e.g., ribbon out, label out).
5	To Printer	CTS (Clear to Send) - When this line is high, the printer assumes that data is ready to be transmitted. The printer will not receive data when this line is low. If this line is not being used, it should be tied high (to pin 4).
6	To Printer	DSR (Data Set Ready) - When this line is high, the printer will be ready to receive data. This line must be high before data is transmitted. If this line is not being used, it should be tied high (to pin 20).
7	Reference	SG (Signal Ground)
20	To Host	DTR (Data Terminal Ready) - This signal applies to Ready/Busy flow control. The printer is ready to receive data when this pin is high. It goes low when the printer is off-line, either manually or due to an error condition, and while printing in the Single Job Buffer mode. It will also go low when the data in the buffer reaches the Buffer Near Full level.

Cable Requirements

DB9	DB25	HOST	INTERCONNECTION	PRINTER
1	1	FG	←——————→	1 FG (Frame Ground)
2	3	RD	←——————	2. TD (Transmit Data)
3	2	TD	——————→	3 RD (Receive Data)
8	5	CTS	←——————	4 RTS (Request to Send)
7	4	RTS	——————→	5 CTS (Clear to Send)
4	20	DTR	——————→	6 DSR (Data Set Ready)
6	6	DSR*	←——————	20 DTR (Data Terminal Ready)
5	7	SG	←——————→	7 SG (Signal Ground)

** This connection at the host side of the interface would depend upon the pin that is being used as the Ready/Busy signal by the driving software. Typically, on a PC, it would be either CTS (pin 5) or DSR (pin 6) on a DB-25 connector.*

READY/BUSY FLOW CONTROL

Ready/Busy is the hardware flow control method for the serial interface on the Se printers. By raising/lowering the voltage level on Pin 20 of the RS232 port, the printer notifies the host when it is ready to receive data. Pin 4 (**RTS**) and pin 20 (**DTR**) are the important signals on the printer for this method of flow control. The

host must be capable of supporting this flow control method for it to function properly.

X-On/X-Off FLOW CONTROL

X-On/X-Off flow control is used whenever hardware (Ready/Busy) flow control is not available or desirable. Instead of a voltage going high/low at pin 20, control characters representing "Printer Ready" **(X-On** =11 hexadecimal) or "Printer Busy" (**X-Off** = 13 hexadecimal) are transmitted by the printer on pin 2 (Transmit Data) to the host. In order for this method of flow control to function correctly, the host must be capable of supporting it. **X-On/X-Off** operates in a manner similar to the function of pin 20 (**DTR**) as previously explained. When the printer is first powered on it sends an **X-Off** when the "Buffer Near Full" level is reached and a **X-On** when the data level of the buffer drops below the "Buffer Available" mark. When the printer is taken off-line manually, it transmits an **X-Off** indicating it cannot accept data. When it is placed back on line manually, it sends an **X-On**, indicating it is again available for receipt of data. If an error occurs during printing (paper out, ribbon out), the printer sends an **X-Off** as soon as an error condition is detected. When the error is cleared and the printer is placed back on-line, it transmits an **X-On** indicating it is again ready to accept data.

Upon power up if no error conditions are present, the printer will continually send **X-On** characters at five millisecond intervals until it receives a transmission from the host.

Data Streams

The data streams for **X-On/X-Off** and **Ready/Busy** flow control are constructed in the same way as they are for Ready/Busy flow control.

<ESC>A . . Job#1 . . <ESC>Z<ESC>A . . Job#n . . <ESC>Z

Example: <ESC>A . . Job#1 . . <ESC>Z

NOTE: All charactersare in ASCII.

UNIVERSAL SERIAL BUS (USB) OPTIONAL INTERFACE

The Universal Serial Bus (USB) interface is a Plug-In Interface Module that can be installed by the user. It requires a driver (shipped with each printer that has the interface installed) that must be loaded on your PC and the PC must be configured to support USB peripherals using Windows 98. Details for loading the USB driver are contained in the USB Interface Manual that is shipped with each printer with a USB Optional interface installed. Up to 127 devices may be connected to a USB port using powered hubs.

GENERAL SPECIFICATIONS

Connector:	USB Type B Plug
Cable:	10 ft (3 m) max

Host: Windows 98
USB Port

ELECTRICAL SPECIFICATIONS

Power Supply: BUS Power through cable

Power Consumption: +5V@80ma

LOCAL AREA NETWORK (LAN) OPTIONAL INTERFACE

A Local Area Network (LAN) interface is a Plug-In Interface Module that can be installed by the user. It requires a driver shipped with each printer that has the interface installed. The driver that must be loaded on your PC and the PC must be configured to run one of the supported network protocols using a 10/100BaseT LAN connection. Details for loading the LAN driver are contained in the LAN Interface Manual that is shipped with each printer with a LAN Optional interface installed.

GENERAL SPECIFICATIONS

Cable: 10/100BaseT Category 5

Connector: RJ-45 Receptical

ELECTRICAL SPECIFICATIONS

Power Supply: Powered from printer

BI-DIRECTIONAL COMMUNICATIONS

This is a two-way communications protocol between the host computer and the printer, thus enabling the host to check printer status. When Bi-Com 4 communications is selected, there is no busy signal from the printer. The host must request the complete status from the printer, including ready/busy. The host may request status in two different ways.

ENQUIRE/ACK/NAK

In the Bi-Com 4 mode, the host transmits an **ENQ** (05 hexadecimal) to the printer and the printer will respond with its status within five milliseconds. If printing, it will respond upon finishing the current label, then resume printing. In order for this protocol to work properly with an RS232 Optional Interface, pin 6 (**DTR**) and pin 5 (**CTS**) must be held high by the host. One way to ensure these pins are always in the correct state is to tie pin 20 (**DTR**) to pin 6 (**DSR**) and pin 4 (**RTS**) to pin 5 (**CTS**) at the printer end of the cable.

Enquire (ENQ)

Upon receipt of an **ENQ** command, the printer responds with 25 bytes of status information bounded by an **STX/ETX** pair. The Bi-Com protocol works only in the Multi Job Buffer mode. The status information is defined as follows:

<STX>{ 2 Byte ID}{1 Status Byte}{6 Byte Label Remaining}{16 Byte Job Name}<ETX>

ID - This is a two byte number identifying the current print job ID. The print job ID is defined using the **<ESC>ID** Job ID command transmitted with the print job (see Job ID Store in the command listing for more information on how to use this command). The range is from 00 to 99.

Status - A single byte defining the current status of the printer (see the Status Byte Definition table).

Label Remaining - Six bytes defining the number of labels remaining in the current print job. The range is from 000000 to 999999 labels.

Job Name - 16 bytes of ASCII characters identifying the name assigned to the job by the <ESC>WK Job Name command. If the Job Name is less than 16 characters, the field will be padded with leading zeroes.

If an **ENQ** is received after the print job specified in the ID bytes has been completed, or there is no data in the buffer, the printer will respond with two “space” characters (20 hexadecimal) for the ID number, six “zero” characters (30 hexadecimal) in the Remaining Labels bytes and the 16 byte Job Name.

Cancel (CAN)

If a **CAN** (18 hexadecimal) command is received , it will stop the print job and clear all data from the receive and print buffers. A delay of five milliseconds or more is required before any new data can be downloaded. The **CAN** command is effective immediately upon receipt, even if the printer is off-line or in an error condition. The printer will return an **ACK** (06 hexadecimal) if there is no printer error condition and a **NAK** (15 hexadecimal) if an error condition exists.

Print Job

Upon receipt of a valid print job **(<ESC>A . . . <ESC>Z)**, an **ACK** (06 hexadecimal) will be returned by the printer if there are no errors and a **NAK** (16 hexadecimal) if a printer error exists.

Print Stop (DLE)

If a **DLE** (10 hexadecimal) is received by the printer, the print process is stopped and an **ACK** (06 hexadecimal) is returned if there are no errors and a **NAK** (16 hexadecimal) if a printer error exists.

Print Start (DC1)

If the printer has been stopped by receipt of a **DLE** (10 hexadecimal) command, it can be restarted by sending a **DC1** (hexadecimal 11) command. Upon receipt of this

command an **ACK** (06 hexadecimal) is returned if there are no errors and a **NAK** (16 hexadecimal) if a printer error exists.

(1) To provide compatibility with older SATO printers, the RS232 interface can be configured to use an earlier Bi-Com 3 ENQ/ACK/NAK protocol selected via DSW2-8 and DSW1-7/8 (on the RS232 Interface module).The earlier protocol did not have provisions for the Job Name and did not respond to the DLE or DCI commands. Also, there are additional Response Codes in the Status Byte Definition. It is recommended that you use the current protocol rather than the earlier version unless it is necessary for compatibility with existing software.

Status Byte Definition, Bi-Com Protocol

ASCII	HEX	DEFINITION
		OFF-LINE
0	30	No Errors
1	31	Ribbon Near End
2	32	Buffer Near Full
3	33	Ribbon Near End and Buffer Near Full
4 (1)	34	Print Stop (no error)
		ON-LINE, WAITING FOR DATA
A	41	No Errors
B	42	Ribbon Near End
C	43	Buffer Near Full
D	44	Ribbon Near End and Buffer Near Full
E(1)	45	Print Stop (without error)
		ON-LINE, PRINTING
G	47	No Errors
H	48	Ribbon Near End
I	49	Buffer Near Full
J	4A	Ribbon Near End and Buffer Near Full
K(1)	4B	Print Stop (without error)
		ON-LINE, WAITING TO DISPENSE A LABEL
M	4D	No Errors
N	4E	Ribbon Near End
O	4F	Buffer Near Full
P	50	Ribbon Near End and Buffer Near Full
Q(1)	51	Print Stop (without error)
		ON-LINE, COMPILING PRINT JOB
S	53	No Errors
T	54	Ribbon Near End
U	55	Buffer Near Full
V(1)	56	Ribbon Near End and Buffer Near Full
W(1)	56	Print Stop (without error)
		OFF-LINE, ERROR CONDITION
b	62	Head Open
c	63	Paper End
d	64	Ribbon End
e	65	Media Error
f	66	Sensor Error
g	67	Head Error
j	6A	Cutter Error
k	6B	Other Error Condition

(1) Not supported by legacy Bi-Com protocols

STATUS RESPONSE

The second method of determining printer status is to interrograte the printer with specific commands. The response from these commands will provide specific information about the printer status depending upon the command. This allows the controlling application to determine the status of a printer when it is located in a remote location.

Printer Status (SOH + MG)

Upon Receipt of an **SOH** (hexadecimal 01) followed immediately by an ASCII **MG** causes the printer to return a 30 byte Printer Status Word bounded by an **STX-ETX** pair that reports the current operating status of the printer.

BYTE NUMBER	HEX VALUE	DESCRIPTION
1	00 01	Thermal Transfer Print Type Direct Thermal Print Type
2	00 01	203 dpi Resolution 305 dpi Resoution
3	00 01 02 03 04 05 06	2 ips Print Speed 3 ips Print Speed 4 ips Print Speed 5 ips Print Speed 6 ips Print Speed 7 ips Print Speed 8 ips Print Speed
4	00 01 02 03 04	Continuous Print Mode Tear-Off Print Mode Cutter Print Mode Label Dispense Print mode Reserved
5	00 01 02	Cut at head position Cut at cutter position No backfeed after cut
6	00 01	Dispense at head position Dispense at dispense position
7	00	Reserved
8	41 42 43	Not Supported Not Supported Not Supported C
9	00 01 02 03 04	Print Density Level 1 Print Density Level 2 Print Density Level 3 Print Density Level 4 Print Density Level 5
10	00 01 02	Reflective (Eye-Mark) Sensor Gap (See-Thru) Sensor No Sensor

BYTE NUMBER	HEX VALUE	DESCRIPTION
11	00 01	Zero Slash Disabled Zero Slash Enabled
12	00	Reserved
13	00 01	Label Media Tag Media
14	00 01	Online Feed Disabled Online Feed Enabled
15	00 01	Fixed Pitch Proportional Pitch
16-17	00 to C80 00 to 12C0	Not Supported
18-19	00 to 340 00 to 4E0	Not Supported
20-21	00 to 3E7 FFFF to FC19	Vertical Base Reference Point Offset in dots (0 to 792) Vertical Base Reference Point Offset in dots (-1 to -792)
22-23	00 to 320 00 to FCE0	Horizontal Base Reference Point Offset in dots (0 to 800) Horizontal Base Reference Point Offset in dots (-1 to -800)
24	00 to 63 FF to 9D	Paper Pitch Offset in dots (0 to 99) Paper Pitch Offset in dots (-1 to -99)
25	00 to 63 FF to 9D	Tear-Off Offset in dots (0 to 99) Tear-Off Offset in dots -1 to -99)
26	00 to 63 FF to 9D	Cut Offset in dots (0 to 99) Cut Offset in dots (-1 to -99)
27	00 to 63 FF to 9D	Dispense Offset in dots (0 to 99) Dispense Offset in dots (-1 to -99)
28	00 01	Compatibility Mode Enabled Compatibility Mode Disabled
29	08 to 40	Label Gap Size in dots (8 to 64 dots)
30	00 01	Buzzer Enabled Buzzer Disabled

Counter Status (SOH + ME)

Upon Receipt of an **SOH** (hexadecimal 01) followed immediately by an ASCII **ME** causes the printer to return a 28 byte Head Counter Status Word bounded by an **STX-ETX** pair that reports the current status of the printer life counters.

BYTE NUMBER	VALUE	DESCRIPTION
1-8	Hex	Current Life Counter in dots
9-12	Hex	1st (Current) Head Counter in dots
13-16	Hex	2nd (Previous) Head Counter in dots
17-20	Hex	3rd Head Counter in dots
21-24	Hex	Current Cut Counter in dots
25-28	Hex	Current Dispense Counter in dots

Sensor Status (SOH + SG)

Upon Receipt of an **SOH** (hexadecimal 01) followed immediately by an ASCII **SG** causes the printer to return a 4 byte Sensor Status Word bounded by an **STX-ETX** pair that reports the values of the printer counters.

BYTE NUMBER	VALUE	DESCRIPTION
1	Hex	Reflective Sensor Level
2	Hex	Transmissive Sensor Level
3	00_H 01_H	Out of Paper Paper Present
4	00_H 01_H	Head Open Head Closed

Head Status (SOH + HC)

Upon Receipt of an **SOH** (hexadecimal 01) followed immediately by an ASCII **HC** causes the printer to return a 1 byte Head Fault Status Word bounded by an **STX-ETX** pair that reports the current operating status of the print head. Before the printer will respond to this command, it must be in the Head Check Mode (DSW2-3 = On).

BYTE NUMBER	HEX VALUE	DESCRIPTION
1	00 01	Print Head OK Electrical Fault in Print Head

System Version Information

Upon Receipt of an **SOH** (hexadecimal 01) followed immediately by a ASCII **SB** causes the printer to return a 50 byte Printer Status Word bounded by an **STX-ETX** pair that reports the system version of the printer.

BYTE NUMBER	VALUE	DESCRIPTION
1-50	ASCII	Firmware Version Information

Memory Status

Upon Receipt of an **SOH** (hexadecimal 01) followed immediately by an ASCII **EB** causes the printer to return a 24 byte Memory Status Word bounded by an **STX-ETX** pair that reports the current user memory allocation.

BYTE NUMBER	VALUE	DESCRIPTION
1-4	Hex	Free Font Memory
5-8	Hex	Total Font Memory
9-12	Hex	Free Form Overlay Memory
13-16	Hex	Total Form Overlay Memory
17-20	Hex	Free Graphic Memory
21-24	Hex	Total Graphic Memory

Form Overlay Status (SOH + FO)

Upon Receipt of an **SOH** (hexadecimal 01) followed immediately by an ASCII **FO** causes the printer to return a 18 byte Form Overlay Status Word bounded by an **STX-ETX** pair that reports the Forms downloaded into the printer.

BYTE NUMBER	VALUE	DESCRIPTION
1-2	01 to 99	Form Registration Number (ASCII value)
3-18	ASCII	Form Name

Font Configuration (SOH + FG)

Upon Receipt of an **SOH** (hexadecimal 01) followed immediately by an ASCII **FG** causes the printer to return a 102 byte Font/Graphics Status Word bounded by an **STX-ETX** pair that reports information on the stored font or graphic.

Note: The printer must be in the Font/Graphic Download (See Section 3: Configuration) mode before a response will be received.

BYTE NUMBER	VALUE	DESCRIPTION
1-2	ASCII	Font ID Number
3-4	00_H 01_H	Font Graphic
5-36	ASCII	Font Name
37-48	ASCII	Font Style
49-52	ASCII	Font Point Size
53-54	Hex	Character Width in dots
54-60	Hex	Character Height in dots
57-60	Hex	Font Size
58-64	Hex	Font Registration Number
65-68	Hex	Font Data Top Address
69-72	Hex	Total Size
73-74	Hex	Vertical/Horizontal Writing Flag
75	Hex	Character Pitch, Fixed/Variable
76	Hex	Family Attribute
77	Hex	Character Set
78	Hex	Italic Attribute
79-80	Hex	Weight Attribute
81-82	Hex	Spread

83-84	Hex	Assent in dots
85-86	Hex	Registration Start Code
86-87	Hex	Registration End Code
88-95	Hex	Reserved
96-98	Hex	Code
99-100	Hex	Horizontal Valid Size
101-102	Hex	Left Gap Size

Interface Status

Upon Receipt of an **SOH** (hexadecimal 01) followed immediately by an ASCII **IG** causes the printer to return a 1 byte Interface Status Word bounded by an **STX-ETX** pair that reports the type of interface connection currently set in the printer.

BYTE NUMBER	VALUE	DESCRIPTION
1	0 1 2 3	IEEE 1284 Parallel Serial RS232 Local Area Network Universal Serial Bus

Serial Interface Settings

Upon Receipt of an **SOH** (hexadecimal 01) followed immediately by an ASCII **H2** causes the printer to return a 5 byte Serial IF Status Word bounded by an **STX-ETX** pair that reports the current operating parameters of the Serial RS232 Interface.

BYTE NUMBER	VALUE	DESCRIPTION
1	0 1 2 3	9600 BPS 19200 BPS 38400 BPS 57600 BPS
2	0 1 3	No Parity Odd Parity Even Parity
3	0 1	1 Stop Bit 2 Stop Bits
4	0 1 2 3 4	Single Item Buffer with Ready/Busy Flow Control Multi-Item Buffer with Ready/Busy Flow Control X-ON/X-OFF Flow Control Status 4 Bi-Comm Status 3 Bi-Comm

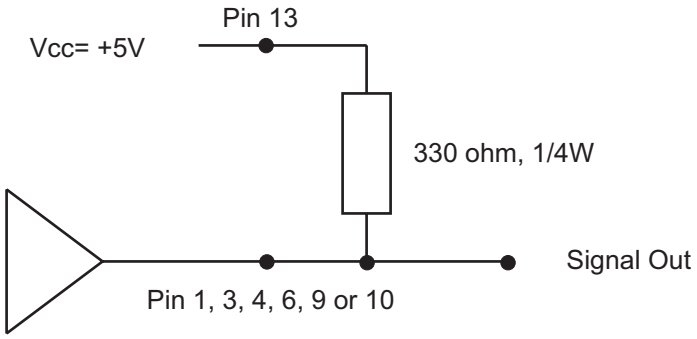
EXT CONNECTOR

The EXT connector on the rear panel of the CL Series “e” printers is intended for use with the external printer accessories such as label rewinders or applicators. The 14-pin Centronics type connector provides a choice of four different output signals along with various error conditions.

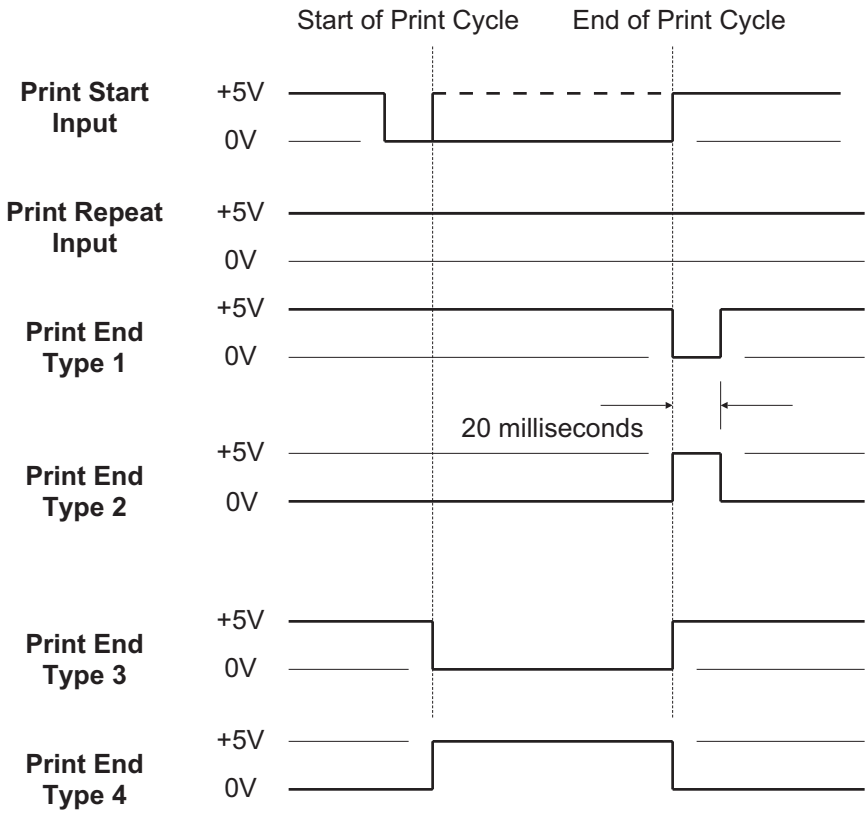
PIN ASSIGNMENTS

PIN	DIRECTION	SIGNAL DESCRIPTION
13	To Host	Vcc - +5V
10	To Host	Ribbon Near End - This pin goes high when the amount of ribbon on the unwind shaft is approximately 46 feet (14 m). The output will be low when the ribon is completely out.
4	To Host	Error - This pin goes low when the printer detects an error condition such as head open or receiving buffer full.
7	To Printer	Reprint - A duplicate of the last label in a print job will be reprinted when this signal is received.
5	To Printer	Print Start - The printer will print one label when this pin is pulled to ground. This signal must be enabled by placing switch DSW3-5 on the Control Panel in the OFF position.
6	To Host	End Print - It is used to drive an applicator or other external device requiring synchronization with the print cycle. You may choose between four types of output signals using control panel DSW3-6 and DSW3-7 selections.See timing charts on next page.
1	To Host	Label Out - This pin goes low (0V) when a label out error exists.
3	To Host	Ribbon Out - This pin goes low (0V) when the ribbon is out.
2	Reference	Signal Ground
8	To Printer	Reserved
9	To Host	Off Line - This pin goes low (0V) when the printer if Off Line.
11		Reserved
12	To Host	+24V +/- 10% @2A - Power for external devices.
14		Frame Ground

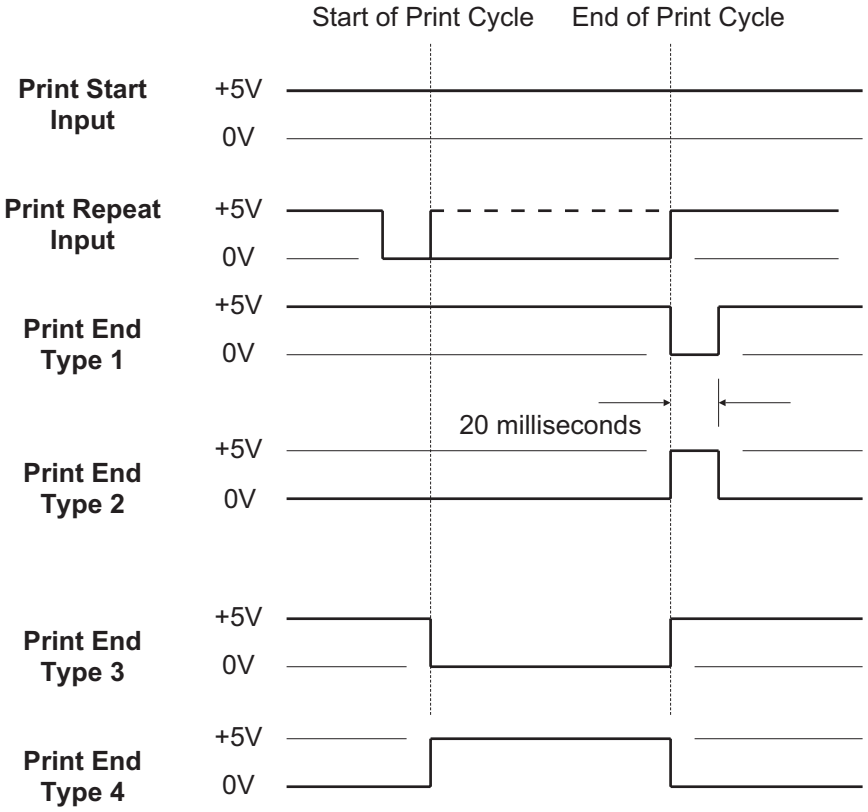
NOTE: The signals on pins 1, 3, 4, 6, 9 and 10 each have an open collector output. These pins normally measure +.07V maximum when a true condition exists. If a false condition occurs, the voltage will drop to 0V. To achieve a signal level of +5V, you must add a 330 ohm, 1/4W pull-up resistor between the open collector output pin and Vcc (pin 13) as illustrated . This will provide a signal level of +5V for a true condition and 0V when a false condition exists. The maximum voltage that can be applied to these pins is +50V and the maximum current they can sink is 500 milliamps.



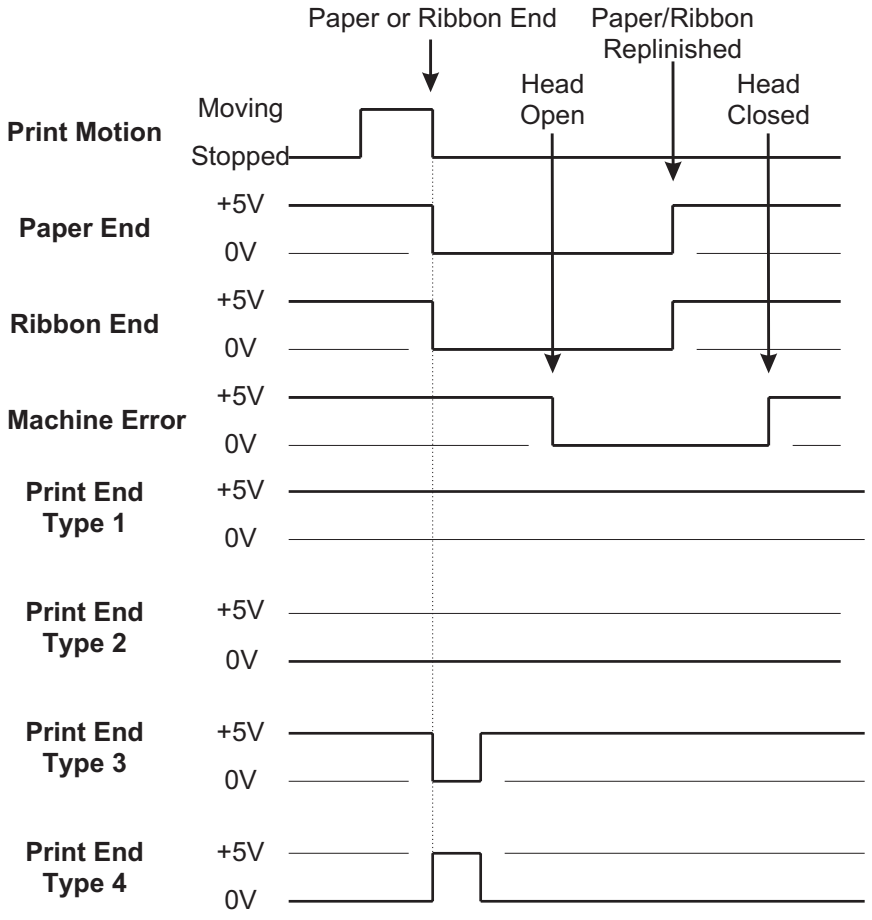
STANDARD OPERATION



REPEAT PRINT



ERROR SIGNALS



SECTION 7.
TROUBLESHOOTING

This section has been devised to help you if you are unable to produce output on the "Se" Series printers. Use this section to make sure the basics have been checked before deciding you are unable to proceed any further. The section is divided into three parts:

- Initial Checklist
- IEEE1284 Parallel Interface
- RS232C Serial Interface
- Universal Serial Bus Interface
- LAN Ethernet Interface

INITIAL CHECKLIST

1. Is the printer powered up and ON-LINE?

2. Is the ERROR light on the front panel off? Is this light is on, it may mean the Print Head Assembly or the Label Hold-Down is not closed and latched in position..

3. Are the LABEL and RIBBON lights on the front panel off? If these lights are on, the labels or ribbons may be incorrectly loaded.

USING THE IEEE1284 PARALLEL INTERFACE

1. Is the IEEE1284 printer cable connected securely to your parallel port (DB-25S Female) on the PC and to the Parallel Interface connector on the printer?

   WARNING: Never connect or disconnect interface cables (or use a switch box) with power applied to either the printer or the host. This may cause damage to the interface circuitry and is not covered by warranty.

2. Does the Parallel interface cable used meet IEEE1284 specifications? If it does not and you are connected to an IEEE1284 or ECP parallel port on the computer, the printer may not be able to communicate correctly.

3. Is there more than one parallel interface port on your PC (LPT1, LPT2, etc.)? If so, make sure you are sending data out the correct port.

4. Is the IEEE1284 Interface Module installed in the printer? Older versions of the Parallel Interface module will not work correctly in the "e" printers.

5. When you send the print job to the printer, and it does not respond, do you get an error message on your PC that says “Device Fault” or something similar?

   This may mean that the computer doesn’t know the printer is there. Verify that:

   a. Both ends of the cable are securely inserted into their respective connectors.

   b. The printer is ONLINE.

   c. The cable is not defective. There are other things that can cause this error
   message on your computer, but at this stage, a defective cable may be one of the reasons.

5. When you send the print job to the printer and it does not respond, and there is no error message on the PC:

   a. Check your data stream for some of the basics. Is your job framed as follows?

   <ESC>A—DATA—<ESC>Z

   b. Verify that you’ve included all required parameters in the data stream.

   c. Verify the following:

- You have not typed a “0” (zero) for an “O” (letter) or vice-versa.
- You have not missed any <ESC> characters where they’re needed.
- Make sure all printer command codes are capital letters.

6. If you’ve checked all of the above and the printer still isn’t printing, you may want to try a Buffer Hex Dump to determine what (if anything) the printer is receiving from your computer. See Printing Hex Dump Labels in Section 3.

   The Parallel port is now listening for incoming data. Send your print job. The printer will now print (only once) a Hexadecimal (Hex) Dump of everything it received from the host computer. Each 2-digit hexadecimal character represents a character the printer received. It may be tedious, but now you can analyze and troubleshoot the data stream.

7. While checking the Hex Dump printout, if you notice $0D_H$ $0A_H$ (Carriage Return and Line Feed) characters throughout. The command string should be continuous and no CR or LF characters are allowed between the Start Command (**<ESC>A**) and the Stop Command (**<ESC>Z**). If you are using BASIC, it may be adding these characters automatically as the line wraps. Adding a “width” statement to your program can help to suppress these extra $0D_H$ $0A_H$ characters by expanding the line length up to 255

characters. See the beginning of Section 5: Command Codes for details on writing a program in BASIC.

If you're not programming in BASIC, check to see if you have an equivalent statement in the language you're using to suppress extra carriage returns and line feeds from your data being sent out to the printer. We want the data stream to be one complete line going to the printer.

USING THE RS232C SERIAL INTERFACE

1. Is the RS232C Serial cable connected securely to your serial port on the PC (DB- 25S or DB-9S Male) and to the RS232C connector on the printer?

   WARNING: Never connect or disconnect interface cables (or use a switch box) with power applied to either the printer or the host. This may cause damage to the interface circuitry and is not covered by warranty.

2. Is the cable defective? At the very least, you should be using a "Null Modem Cable," which crosses pins in a specific manner. This should enable your printer to print. But we recommend that you eventually use a cable built to specifications as described in Section 6: Interface Specifications.

3. Is the RS232 Interface Module installed in the printer?

4. Check for obvious errors in the data stream. Is the data properly framed with the <ESC>A and <ESC>Z commands? See Section 5 if necessary.

5. If after sending your job to the printer, it only "beeps" and displays an error message on the LCD display, you may have a configuration problem. There may be some inconsistencies with the Baud Rate, Parity, Data Bits, or Stop Bits in relation to your host computer. If you are confused as to what the printer's current RS232 settings are, print a Configuration Test label(see Section 3). It will list all of the current printer configuration settings.

6. If you still are unable to get printer output, try the Hex Dump as described in Step 5 under the Parallel Interface troubleshooting. In this case, the printer monitors the RS232C interface for incoming data.

7. From the Hex Dump, if you are seeing extra $0D_H$ $0A_H$ (CR and LF) characters, and are using BASIC, refer to the beginning of the Command Code section. It provides hints for writing a SATO program in BASIC.

UNIVERSAL SERIAL BUS (USB)

If nothing prints when doing a test print you will need to verify that the device drivers have been successfully installed by doing the following:

1. Click on Start, then Settings and then Control Panel.

2. Within the new Window you should have an Icon listed as System. Double Click on this.

3. Click on the Device Manager tab.

4. Make sure that the View Device by type is checked. Scroll down until you get to SATO-USB device.

5. Verify that it does not have any errors next to it. If it shows an error, remove the device and then reinstall it.

6. Reboot the PC and the Printer.

7. Consult the Windows 98 Troubleshooting guide or contact technical support for further assistance.

LAN ETHERNET INTERFACE

Printer Does Not Come Up Ready

If you cannot print to the print server after you install it, check the following:

1. Make sure that the printer are powered on, that all cables are securely plugged in, and that the printer is on-line.

2. If possible, connect a terminal to the serial port. If you see the boot prompt, the print server firmware has not been loaded properly. If reloading does not fix the problem, try setting switch 1 to ON (factory defaults) and powering the print server off and then on again; if the problem persists, the product may be defective.

Installation Problems (Printer Comes up Ready but You Cannot Print)

If the printer starts up OK but you cannot print, the problem could one of the following:

- There is a problem with the interface between the print server and the printer
- There is a problem with the network connection or cabling.
- There is a queue setup problem, a print server setup problem, or other protocol-related problem.

Checking the Interface between the Print Server and the Printer

First make sure that the cable between the print server and the printer is securely plugged in at both sides. Then:

1. Wait about two minutes after the printer is powered on and then run a printer self-test (see *Secton 3:Configuration* for information on how to run the self-test).

- If the self-test does not print, then there is possibly a hardware problem. Double check the connections.
- In some rare instances, disabling NBUF with the command SET PORT P1 NBUF DISABLED will solve port compatibility issues.

Checking the Network Connection and Cabling

If the self-test page prints but you cannot print documents, first check the network connection and cabling.

1. If you are connecting to a 10baseT network, verify that the OK LED is on. If the appropriate LEDs are not on, there is probably a bad 10baseT or 100baseTX cable or the hub port is bad. If possible, try a different cable and hub port, or try connecting a different device (such as a PC) to the cable.

2. If you are using a repeater or hub, make sure that SQE (heartbeat) is turned off at the hub (this is the default setting for most hubs). Also, if you have a hub or multiport repeater, verify that the hub or repeater port is good by trying the print server on a different port.

3. If you have a bridge or router located between the print server and the host computer, make sure that the device is set up to allow the print server to send and receive data from the host. For example, a bridge can be set up to only allow certain types of Ethernet addresses to pass through (a process known as filtering); therefore, such a bridge must be configured to allow print server addresses. Likewise, a router can be set up to pass only certain protocols, so be sure that the desired protocol can be passed through to the print server. In the case of routers, also make sure that the protocol is routable (LAT, NetBEUI, and DLC/LLC are not routable).

4. Make sure that you are not trying to perform an illegal operation, such as attempting to print a label larger than the printer can handle.

5. Check the individual protocol troubleshooting sections in this chapter for additional causes of intermittent printer problems.

Intermittent Problems

If the print server and the printer start up OK, but you intermittently have problems printing, check the following:

1. Excessive NetWare polling can be a big cause of intermittent problems. Make sure that you have only enabled the NetWare file servers that you need for printing (do a SHOW NETWARE command from the print server console to see the enabled file servers). If you have V3.21 or earlier firmware, make sure that NetWare polling is disabled by using the console command SET NETWARE RANGE 0. If you are not using NetWare, you can disable NetWare entirely with the command SET NETWARE DISABLED.

2. Check the individual protocol troubleshooting sections in this chapter for additional causes of intermittent printer problems.

TCP/IP Troubleshooting

If you are using TCP/IP and cannot print to the print server and you have checked the hardware and network as described in the previous steps, then check the following (*note that it is always a good idea to try creating a another print queue to eliminate the possibility of setup errors*):

1. The problem may be the result of mismatched or duplicate IP addresses. Verify that the IP address is correctly loaded into the XCD print server (via the self-test page or through the remote console) and make sure that no other nodes on the network have this address (DUPLICATE IP ADDRESSES ARE THE BIGGEST CAUSE OF TCP/IP PRINTING PROBLEMS). If the address is not correct, then check whether the loading procedure was properly executed.

2. If you used NCP, XCONFIG, or ccr to enter the IP address, make sure that you exited the remote console properly with a CTRL-D or EXIT command.

3. If you used rarp, make sure that you started the rarp daemon using the rarpd, rarpd -a, in.rarpd -a, or equivalent command. Verify that the /etc/ethers file contains the correct Ethernet address and that the print server name matches the name in the /etc/hosts file.

4. If you used bootp, make sure that bootp is enabled (i.e., the "#" is removed from the bootp entry) in the

   /etc/inetd.conf file. Verify that /etc/bootptab file is correctly configured.

5. Also verify that the host computer and the print server are either on the same subnet (for example, if the print server has a subnet mask of 255.255.255.0, the host must have the same subnet mask) or that the router is properly configured to pass data between the two devices.

6. Make sure that the /etc/printcap file (if applicable) is typed in correctly. In particular, look for missing ":" and "\" characters, because a small error *anywhere* in the file can have *major* consequences. Also check the /usr/spool directory to make sure that you have created a valid spool directory.

7. If you are using a Berkeley-based UNIX, make sure that the daemon is started on Berkeley based systems with the command lpc start *printer*, where *printer* is the name of the local print queue.

8. If you are using an AT&T-based UNIX, make sure the printer is enabled (enable *printer*, where *printer* is the name of the local print queue).

9. Make sure that the lpr/lpd remote line printer service are running on the host computer (refer to your host computer documentation for information on how to do this).

10. If you cannot print from DEC TCP/IP Services for VMS (UCX), make sure that you have version 2.0B or later of this software, because earlier versions will not work with the print servers.

11. If jobs are run together or do not eject from the printer, try setting the service (remote printer) with EOT set to the appropriate printer reset string. This string is number 4 (%-12345X) for all newer HP printers. For example:

    SET SERVICE BINARY_P1 EOT 4

12. If the lines of a text file are staggered, make sure that you have specified a remote printer (rp) name of TEXT in your /etc/printcap file.

13. If you are having trouble printing long jobs (over 1MB), add the line mx#0 to your /etc/printcap file entry. **Important:** *Sun Solaris has a bug with lpr/lpd printing and long jobs. This bug affects any diskless print server. The solution is to use the HP JetDirect UNIX host printing utilities as described in the Raw TCP Port section at the end of Chapter 4.*

14. If you are using the raw TCP port and are experiencing intermittent queue stalling problems, make sure that queueing is enabled on the service (do a SHOW SERVICE command from the remote console, and note if "Q" is listed in the OPT column for the desired service). If it is not, enable queueing with the command SET SERVICE *servicename* QUE ENA command.

15. If the wrong IP address is loaded, check your network for file servers that have DHCP, BOOTP, or rarp enabled, and make sure that these file servers are not set up to load IP addresses into the print server. Also, make sure that you do not use the command SET IP BOOT 0 to disable TCP/IP broadcasts; instead, you should use the command SET IP METHOD STATIC (unpredictable results will occur otherwise).

16. If you have problems with queues locking up when the active print job is deleted, try setting the IP timeout to one minute with the console command SET IP TIMEOUT 1.

7. There were a number of lpr/lpd-related problems fixed in the V3.46 firmware. Therefore, if you are experiencing intermittent queue problems and you have an older version of firmware, SATO recommends that you upgrade to 3.46 or later.

NetWare Troubleshooting

If you cannot print from NetWare and you have checked the hardware and network as described in the previous steps, first verify that the print server is attached to the server queue by going to PCONSOLE, selecting PRINT QUEUE INFORMATION, and then CURRENTLY ATTACHED SERVERS. If the print server does not appear in the list of attached servers, then check the following (*note that it is always a good idea to try deleting and recreating the print server and creating a new print queue in order to eliminate the possibility of setup errors*):

1. If you cannot create a print queue, make sure that you have sufficient NetWare privileges. With NetWare 3.12 and earlier, you MUST be logged in as SUPERVISOR (not someone with Supervisor privileges). If you are having problems creating queues with NetWare 4.xx and later, try logging

in as ADMIN. Also, make sure that you are not trying to run XAdmin32 with the Microsoft NetWare client (you must use the Novell 32-bit client).

2. If you changed the login password, you must change the password in *both* the print server (using the SET NETWARE PASSWORD command) and in the file server (using the PCONSOLE Print Server Information Change Password command).

3. Make sure that you have enabled at least one NetWare file server using the SET NETWARE SERVER *servername* ENABLED command.

4. Have you exceeded your NetWare user limit?

5. If you have V3.00 or earlier firmware , make sure that you enabled either 802.3 or Ethernet II frames on your file server, particularly if you have a NetWare 3.12 or 4.xx file server (since these NetWare versions default to 802.2), since these versions of firmware do not support 802.2 or SNAP frames. Also, if you are using NetWare 4.xx, make sure that you have enabled bindery emulation on the file server.

6. Make sure that the print server name you used in PCONSOLE *exactly* matches the name that is configured in the print server, and make sure it is defined as a Queue Server for the print queue.

7. If you are running both 802.3 and Ethernet II frames on different file servers on your network, there is a possibility that the print server may not make a connection to the desired file server. Try forcing the frame type to the desired one using the SET NETWARE FRAME command from the print server remote console.

8. If you are losing portions of your print job and you are using the DOS NetWare drivers, try setting the TIMEOUT parameter in your CAPTURE statement to a higher value (at least 50 seconds for Windows).

Windows NT/LAN Server Troubleshooting

If you are having trouble printing with Windows NT or LAN Server, check the following:

1. Make sure that you can ping the print server using the DOS or OS/2 command PING *ipaddress*, where *ipaddress* is the IP address of the print server. If you cannot ping the print server, you will not be able to print.

2. Make sure that TCP/IP and lpr printing are installed and running on the Windows NT system or the LAN Server file server.

3. If you are having problems printing to the print server from a client PC that is connected to a Windows NTAS or LAN Server file server, verify that you can print a job directly from the DOS or OS/2 prompt on the file server. If you can print from the file server but not from the client, then the problem is probably with the NetBEUI communications rather than with the TCP/IP link to the print server. Check your file server network

setup (for example, make sure that you can print from the client to other printers on the network.

4. If you have problems with Windows NT queues locking up when the active print job is deleted, try setting the IP timeout to one minute with the console command SET IP TIMEOUT 1.

5. There were a number of lpr/lpd-related problems fixed in the V3.46 firmware. Therefore, if you are experiencing intermittent queue problems and you have an older version of firmware, SATO recommends that you upgrade to 3.46 or later.

Windows 95/98 Peer-to-Peer Troubleshooting

If you are having trouble printing on a Windows 95 Peer-to-Peer network, check the following:

1. If the print server does not show up under JetAdmin on a Windows 95/98 Peer-to-Peer network, try removing all of the Windows 95 network software from the Network Control panel and then reinstalling them as follows:

- First install the **IPX/SPX-Compatible Protocol**, the **Client for Microsoft Networks**, and the network adapter card driver.
- Restart the system, and then add the **HP JetAdmin** service.

2. Because of the many changes that have been incorporated in Windows 95/98 Peer-to-Peer printing since its introduction, it is a good idea to upgrade to the latest version of JetAdmin (available on the HP web site at http://www.hp.com).

ERROR SIGNALS

The LCD Display, Front Panel LED Indicators and Buzzer provide a visual/audio indication of the type of error encountered.

LED	LCD MESSAGE	AUDIBLE BEEP	ERROR CONDITION	TO CLEAR
Error On	Machine Error	1 Long	Machine Error	Cycle power on/off
Error On	EEPROM Error	1 Long	EEPROM Read/Write	Cycle power on/off
Error On	Head Error	1 Long	Head	Cycle power on/off
Error On	Sensor Error	3 Short	Sensor	Cycle power on/off
Error Blinks	Card R/W Error	1 Long	Memory Card Read/Write	Cycle power on/off
Error Blinks	Card Low Battery	1 Long	Memory Card Battery Low	Cycle power on/off
Error Blinks	Head Open	3 Short	Head Open	Close head lever
Error Blinks	Cutter Error	3 Short	Cutter	Cycle Power On/Off
Error On Line Blinks	Parity Error	3 Short	RS232 Parity Error	Cycle power on/off
Error On Line Blinks	Overrun Error	3 Short	RS232 Overrun Error	Cycle power on/off
Error On Line Blinks	Framing Error	3 Short	RS232 Framing Error	Cycle power on/off
Error On Line Blinks	Buffer Over	3 Short	Buffer Overflow	Cycle power on/off
Error Blinks Label On	Paper End	3 Short	Label End	Open/close Head Lever Open/close Label Hold-down
Error Blinks Ribbon On	Ribbon End	3 Short	Ribbon End	Open/close Head Lever Open/close Label Hold-down
Error Blinks Label Blinks	Media Error	3 Short	Media Error	Open/close Head Lever
Ribbon Blinks		None	Ribbon Near End	Replace ribbon with full roll
Line Blinks		None	Buffer Near Full	Slow down transmission rate

APPENDIX A.
COMMAND CODE QUICK REFERENCE

INSTRUCTION	DESCRIPTION	PAGE
A	**Start Code**. Begins all print jobs.	Page 5-
A1aaaabbbb	**Media Size.** Specifies the label size. aaaa = Label Width in dots (0 to Vmax) bbbb = Label Length in dots (0 to Hmax)	Page 5-
A(space)Z	**Form Feed**. Feeds a blank tag or label.	Page 5-
AR	**Normal Print Length**. This command resets the printer to the Standard print length (7 inches).	Page 5-
A3H-aaaa -Vbbbb	**Base Reference Point**. Establishes a new base reference point position in dots for the current label. Units of measurement are dots. - = Optional character. If included, will shift reference point in negative direction.	Page 5-

	CL408e	CL412e	CL608e	CL612e
aaaa = Horizontal Print Offset	+/- 896	+/- 1248	+/- 1216	+/- 1984
bbbb = Vertical Print Offset	0001 to 1424	0001 to 2136	0001 to 1424	0001 to 2136

Babbcccd — Bar Codes. Prints a 1:3 ratio bar code. Page 5-

a=
- 0 Codabar
- 1 Code 39
- 2 Interleaved 2 of 5 (I 2/5)
- 3 UPC-A/EAN-13
- 4 EAN-8
- 5 Industrial 2 of 5
- 6 Matrix 2 of 5
- 7 reserved
- 8 reserved
- 9 reserved
- A MSI
- B reserved
- C Code 93
- D reserved
- E UPC-E
- F Bookland
- G Code 128
- I UCC 128

bb = Number of dots (01-12) for narrow bar and narrow space

ccc = Bar height in dots (001-600)

d = UCC 128 only
- 0 No human readable text
- 1 Human readable at top
- 2 Human readable at bottom

INSTRUCTION	DESCRIPTION	PAGE
BDabbcccd	**Bar Codes**. Prints a 2:5 ratio bar code, except for UPC, EAN, Code 93, Code 128 and UCC128 symbols, which are fixed width bar codes. For values a, bb, ccc and d see instructions for Babbcccd. For UPC/EAN bar codes, this command puts descender bars and humand readable text below the symbol.	Page 5-
BKaabbcdd eeefffnn...n	**PDF417**. Prints PDF417 2-D symbols. aa = Minimum module dimension (03-09 dots). Will not print for values of 01, 02 or ≥ 10. bb = Minimum module pitch dimension (04-240 dots). Will not print for values of 01, 02, 03 or greater than 25. c = Security level (1-8). dd = Code words per line (01-30). If 00 is specified for dd *and* ee, printer will automatically optimize settings. ee = Rows/symbol (00 or 03). If 00 is specified for dd *and* ee, printer will automatically optimize settings. fff = Number of characters to be encoded (0001-2700) g = Not specified, standard PDF417 M Micro PDF417 T Truncated PDF417 nn...n = Data to be printed.	Page 5-
BPn...n	**Postnet**. Prints Postnet bar codes. n...n = 5 digit ZIP (Postnet-32 format) 6 digits (Postnet-37 format) 9 digit ZIP+4 (Postnet -52 format) 11 digit ZIP+4+DPC (Postnet-62, Delivery Point format).	Page 5-
BTabbccddee	**Bar Codes**. Variable Ratio. provides the ability to print a bar code with a ratio other than those specified through the standard bar code commands (B, BD, and D). a = Bar code option: 0 Codabar 1 Code 39 2 Interleaved 2 of 5 5 Industrial 2 of 5 6 Matrix 2 of 5 bb = Narrow space in dots (01-99) cc = Wide space in dots (01-99) dd = Narrow bar in dots (01-99) ee = Wide bar in dots (01-99)	Page 5-
BVa,b,c, ddddddddd, eee,f f f,gg..g	**Maxicode**. Prints 2-D Maxicode symbols per AIM I.S.S. specification. a = Position of symbol within the set b = Total number of symbols in the set c = Mode dd..d = 9 digit numeric Postal Code eee = 3 digit numeric Country Code f f f = 3 digit numeric Service Class gg..g = Data, terminated by <ESC>	Page 5-

INSTRUCTION	DESCRIPTION	PAGE

BWaabbb — **Bar Codes**. Expansion. Works together with the BT command to specify an expansion factor and the bar code height for the particular symbol being printed. Page 5-

- aa = Expansion factor by which the width of all bars and spaces is increased (01-12)
- bbb = Bar height by dot (004-600 dots)

BXaabbccdd eeefffghh — **Data Matrix**. Data Format. Specifies the format of the Data Matrix 2-D symbology. Page 5-

- aa = Format ID (01-16, The values 07 and 17 will not be accepted)
- bb = Error correction level (00, 01, or 04-14, the values 02, 03 or ≥ 15 will not be accepted).
- cc = Horizontal cell size (03-12 dots/cell)
- dd = Vertical cell size (03-12 dots per cell)
- eee = Cells per line. Must use 000 for optimized symbol.
- fff = Cell lines. Must use 000 to optimize.
- g = Mirror image
  - 0 Normal Print
  - 1 Reverse Print
- hh = Guide cell thickness (01-15) 01 indicates normal type.

C — **Repeat Label**. Prints a duplicate of the last label printed. Page 5-

CSa — **Print Speed Selection**. Specifies a unique print speed in in./sec. through software for a particular label. Page 5-

	CL408e	CL412e	CL608e	CL612e
a = Speed Setting	1 = 2 ips 2 = 3 ips 3 = 4 ips 4 = 5 ips 5 = 6 ips		4 = 4 ips 6 = 6 ips 8 = 8 ips	

Dabbcccd — **Bar Codes**. Prints 1:2 ratio bar code. For UPC and EAN bar codes, this will add descender bars. For values a, bb, ccc and d see instructions for Babbcccd. Page 5-

DCxx...x — **Data Matrix**. Print Data. Prints data using Data Matrix format specified in BX Data Format command. Page 5-

- xx...x = Data to be printed. Cannot exceed 500 characters.

Eaaa — **Line Feed**. Provides the ability to print multiple lines of the same character size without specifying a new print position for each line. Page 5-

- aaa = Number of dots (1-999) between the bottom of the characters on one line to the top of the characters on the next line.

EX0 — **Expanded Print Length**. Expands the print length to 9999 dots. Page 5-

INSTRUCTION	DESCRIPTION	PAGE

Faaaabcccc ddee

Sequential Numbering. Allows the printing of sequencing fields (text, bar codes) where all incrementing is done within the printer. Page 5-

- aaaa = Number of times to repeat the same data (0001-9999)
- b = Plus or minus symbol (+ for increments; - for decrements)
- cccc = Value of step for sequence (001-9999)
- dd = No. of digits for sequential numbering (01-99, default = 8)
- ee = No. of digits free from sequential numbering (01-99, default = 0)

FWaaHbbbb

Horizontal Line. Prints a horizontal line. Units of measurement are dots. Page 5-

	CL408e	CL412e	CL608e	CL612e
aa = Width of Hor Line	01 to 99			
bbbb = Length of Hor Line	0001 to 0832	0001 to 1248	0001 to 1216	0001 to 1984

FWaabbVccc Hdddd

Box. Prints a box. For values aa, bbbb, cc, and dddd, see instructions for horizontal and vertical lines. Units of measurement are dots. Page 5-

	CL408e	CL412e	CL608e	CL612e
aa = Width of Hor Side	01 to 99			
bb = Width of Vert Side	01 to 99			
cccc = Length of Vert Side Expanded	0001 to 1424 0001 to 9999	0001 to 2136 0001 to 9999	0001 to 1424 0001 to 9999	0001 to 2136 0001 to 9999
dddd = Length of Hor Side	0001 to 0832	0001 to 1248	0001 to 1216	0001 to 1984

FWccVddd

Vertical Line. Prints a vertical line. Units of measurement are dots. Page 5-

	CL408e	CL412e	CL608e	CL612e
cc = Width of Vert Line	01 to 99			
dddd = Length of Vert Line Expanded	0001 to 1424 0001 to 9999	0001 to 2136 0001 to 9999	0001 to 1424 0001 to 9999	0001 to 2136 0001 to 9999

FXaaabccc dddeee

Data Matrix. Sequential Numbering. Prints sequential numbered Data Matrix 2-D symbols. Page 5-

- aaa = Number of duplicate labels (001-999)
- b = Increment or decrement
  - \+ Increment
  - \- Decrement
- ccc = Increment/decrement steps (001-999)
- ddd = Sequential numbering start position (001-999). Referenced to left side.
- eee = Incremented data length (001-999). Measured from start position.

INSTRUCTION	DESCRIPTION	PAGE

Gabbbccc(data) **Custom Graphics**. Allows the creation and printing of graphic images using a dot-addressable matrix. Page 5-

- a = Specifies format of data stream to follow
  - B Binary
  - H Hexadecimal
- bbb = Number of horizontal 8 x 8 blocks
- ccc = Number of vertical 8 x 8 blocks
- data = Data to describe the graphic image

GMaaaaa **BMP File**. Downloads BMP file to the internal graphics image memory. Page 5-

- aa..a = No. of bytes to be downloaded (max DOS file size = 32K

GPaaaaa **PCX File**. Downloads PCX file to the internal graphics image memory. Page 5-

- aa..a = No. of bytes to be downloaded (max DOS file size = 32K)

Haaaa **Horizontal Position**. Specifies a field's horizontal location across the width of the label from the current base reference point. The units of measurement are dots. Page 5-

	CL408e	CL412e	CL608e	CL612e
aaaa = New Horizontal Position	0001 to 0832	0001 to 1248	0001 to 1216	0001 to 1984

IDaa **Store Job ID**. Stores the Job ID number. Page 5-

- aa = Job ID number assigned (01-99)

J **Journal Print**. Provides the ability to print text line by line. Fixed spacing between lines and characters. Page 5-

Kab90cc **Recall Custom Designed Characters**. Recalls for printing a custom character stored by the Tabcc(data) command. Page 5-

- a = 1 16 x 16 matrix
  - 2 24 x 24 matrix
- b = Indicates the format that data stream was stored in
  - B Binary
  - H Hexadecimal
- bb = Memory location where the character was stored. Valid locations are 21 to 52 or "!" to "R" in hex values.

Laabb **Character Expansion**. Expands characters in both directions. Page 5-

- aa = Multiple to expand horizontally (01-12)
- bb = Multiple to expand vertically (01-12)

M **Font type**. Specifies the 13W x 20H dot matrix font (including descenders). Page 5-

OA **Font type**. Specifies the OCR-A font with dot matrix. Page 5-

	CL408e	CL412e	CL608e	CL612e
OA Font Matrix	15W x 22H	22W x 33H	15W x 22H	22W x 33H

INSTRUCTION	DESCRIPTION	PAGE

OB — **Font type**. Specifies the OCR-B font dot matrix. Page 5-

	CL408e	CL412e	CL608e	CL612e
OB Font Matrix	20 W x 24H	30W x 36H	20 W x 24H	30W x 36H

Paa — **Character Pitch**. Designates the number of dots between characters. Page 5-
- aa = Number of dots between characters (01-99)

PR — **Fixed Font Spacing**. Returns the printer to fixed character spacing mode. Page 5-

PS — **Proportional Font Spacing**. Places the printer in the proportional character spacing mode. Will not work with U Font. Page 5-

Qaaaaaa — **Print Quantity**. Specifies the total number of labels to print. Page 5-
- aaaaaa = Total number of labels to print for the job (000001-999999)

RDabb,ccc, ddd,nn...n — **Font Type.** Specifies the internal AGFA raster fonts. Paghe 5-
- a = A Specifies CG Times font
  B Specifies CG Triumvirate font
- bb = 00 Specifies Normal
  01 Specifies Bold
- ccc = Horizontal Size (16 to 999 dots or P08 to P72 point size)
- ddd = Vertical Size (16 to 999 dots or P08 to P72 point size)
- nn..n = Data to be printed

RMaaaa,bbbb — **Mirror Image.** Prints mirror image of data. Page 5-
- aaaa = Horizontal position of the top left corner of image area to be mirrored.
- bbbb Vertical position of the top left corner of image area to be mirrored.

S — **Font type**. Specifies the 8W x 15H dot matrix font (including descenders). Page 5-

Tabcc(data) — **Store Custom Designed Characters**. To create and store custom characters or images in the printer's volatile memory. See Kab90cc to recall the character for printing. Page 5-
- a = 1 16 x 16 matrix
  2 24 x 24 matrix
- b = Specifies data stream format to follow
  B Binary
  H Hexadecimal
- cc = Memory location to store the character.
  Valid locations are 21 to 52 or "!" to "R" in hex values.
- (data)= Data to describe the character.

U — **Font type**. Specifies a 5W x 9L dot matrix font (including descenders). Page 5-

INSTRUCTION	DESCRIPTION	PAGE

Vbbbb

Vertical Position. Specifies a field's vertical location down the length of the label from the current base reference point. Units of measurement are dots.

Page 5-

	CL408e	CL412e	CL608e	CL612e
bbbb = Vert Position	0001 to 1424	0001 to 2136	0001 to 1424	0001 to 2136
Expanded	0001 to 9999	0001 to 9999	0001 to 9999	0001 to 9999

WBa

Font type. Specifies the 18W x 30L dot matrix font (including descenders).

a = 0 Disables auto-smoothing of font
1 Enables auto-smoothing if expansion is greater than 3

Page 5-

WDHaaaaVbbbb XccccYdddd

Copy Image Area. To copy an image to another location of the label.

aaaa = Horizontal position of the top left corner of image area
bbbb = Vertical position of the top left corner of image area
cccc = Horizontal length of image area
dddd = Vertical length of image area

Page 5-

WKnn...n

Job Name. Stores the job name.

nn..n = Job name, up to 16 ASCII characters

Page 5-

WLa

Font type. Specifies the 28W x 52L dot matrix font (including decenders).

a = 0 Disables auto-smoothing of font
1 Enables auto-smoothing if expansion is greater than 3

Page 5-

XM

Font type. Specifies the 24W x 24H dot matrix font (including descenders).

Page 5-

XS

Font type. Specifies the 17W x 17H dot matrix font (including descenders).

Page 5-

XU

Font type. Specifies the 5W x 9L dot matrix font (including descenders).

Page 5-

XWa

Font type. Specifies the 48W x 48L dot matrix font (including descenders).

a = 0 Disables auto-smoothing of font
1 Enables auto-smoothing if expansion is greater than 3

Page 5-

XBa

Font type. Specifies the 48W x 48L dot matrix font (including descenders).

a = 0 Disables auto-smoothing of font
1 Enables auto-smoothing if expansion is greater than 3

Page 5-

Z

Stop Code. Ends all print jobs.

Page 5-

INSTRUCTION	DESCRIPTION	PAGE
%a	**Rotate.** Fixed Base Reference Point. Rotates printing in 90° increments without changing the base reference point. a = 0 Sets print to normal direction 1 Sets print to 90° CCW 2 Sets print to 180° rotated (upside down) 3 Sets print to 270° CCW (90° CW)	Page 5-
$a,b,c,d	**Vector font**. Specifies printing of the unique SATO vector font. a = A Helvetica Bold (proportional spacing) B Helvetica Bold (fixed spacing) b = Font width (50-999 dots*) c = Font height (50-999 dots*) d = Font variation (0-9) as follows: 0 Standard 1 Standard open (outlined) 2 Gray (mesh) pattern 1 3 Gray (mesh) pattern 2 4 Gray (mesh) pattern 3 5 Standard, shadow 1 6 Standard, shadow 2 7 Standard mirror image 8 Italic 9 Italic open (outlined)	Page 5-
$=(data)	**Data** for Vector font.	Page 5-
#Ea	**Print Darkness**. Specifies a new print darkness setting. The lightest setting is “1”. The darkenss levels that can be specified are:	Page 5-

	CL408e	CL412e	CL608e	CL612e
a = Print Darkness	1, 2, 3, 4, or 5		1, 2 or 3	

INSTRUCTION	DESCRIPTION	PAGE

(aaaa,bbbb **Reverse Image.** Reverse image from black to white and vice versa. Units of measure are dots. Page 5-

	CL408e	CL412e	CL608e	CL612e
aaaa = Hor Length	0001 to 0832	0001 to 1248	0001 to 1216	0001 to 1984
bbbb = Vert Length Expanded	0001 to 1424 0001 to 9999	0001 to 2136 0001 to 9999	0001 to 1424 0001 to 9999	0001 to 2136 0001 to 9999

& **Store Form Overlay**. Stores a specified label image in the printer's volatile form overlay memory. Page 5-

/ **Recall Form Overlay.** Recalls the label image from the printer's formoverlay memory for printing. Page 5-

0 (zero) **Replace Data (Partial Edit)**. Provides the ability to replace a specified area of the previous label with new data. Page 5-

*a **Clear Print Job(s) and Memory.** Clears individual memory and buffers. Page 5-

- a = When not included in command, clears print jobs in Multi-Buffer mode.
- a = If included in command, specifies memory section to be cleared
  - T Custom character memory, printer
  - & Form overlay memory, printer
  - X Clears all memory all memory and buffers

@ **Off-Line**. Signals the printer to go off-line after the completion of a print job. Page 5-

~aaaa **Cut Job.** Cuts labels at a specified interval in a print job. Number of labels printed is equal to the product of the Quantity specified times the value of aaaa. Page 5-

- aaaa = Number of labels between each cut (0001 to 9999)

~Aaaaa **Cut.** Specifies the number of labels to print between each cut. It is independent of the Quantity command. Page 5-

- aaaa = Number of labels between each cut

~B **Cut Last.** Cuts any printed labels that remain in the printer Page 5-

INSTRUCTION	DESCRIPTION	PAGE

Calendar Option Commands

WA(elements)

Calendar Print. Prints the date and/or time field (up to 16 characters) from the printer's internal clock. Use slash to separate date elements and colon to separate time elements. Page 5-

elements =

YY	2 digit Year (00-91)
YYYY	4 digit Year (1981-2080)
MM	Month (01-12)
DD	Day (01-31)
HH	12 Hour Clock (00-11)
hh	24 Hour Clock (00-23)
mm	Minutes (00-59)
ss	Seconds (00-59)
TT	AM or PM
JJJ	Julian Date (000-366)
WW	Week (00-53)
ww	Week (01-54)

WPabbb

Calendar Increment. To add a value to the printer's current date and/or time. Does not change the printer's internal time setting. Page 5-

a = Y Years
M Months
D Days
h Hours

bbb = Numeric data, Week (00-99), Years (1-9), Months (01-99), Days (001-999), Hours (001-999).

WTaabbccddee

Calendar Set. To set the time and date of the printer's internal clock. Page 5-

aa = Year (00-99)
bb = Month (01-12)
cc = Day (01-31)
dd = Hour (00-23)
ee = Minute (00-59)

Expanded Memory Option Commands

BJ(aa..abb..b

Start TrueType Font Storage. Prepares the Expanded Memory to accept TrueType font data. Page 5-

aa...a = 40 byte font description
bb...b = 10 byte date field

BJDcccccdddd ee...e

Download Bit Mapped TrueType Font Data. Downloads the bit mapped TrueType font data to the memory area specified. Page 5-

ccccc = Memory Offset (hexadecimal)
dddd = Data size in bytes (max = 2000)
ee...e = Font data to be downloaded

BJ)

End TrueType Font Storage.Ends the bit mapped TrueType font storage process Page 5-

INSTRUCTION	DESCRIPTION	PAGE
BJFaaaaaaaa	**Initialize Memory Card**. Initializes the Memory Area and formats it for use. Should be preceded by the Memory Area Select command for the memory area to be initialized. aaaaaaaa = 8 character alphanumeric password	Page 5-
BJRabbccdd eeeeff..f	**TrueType Font Recall**. Recalls a previously stored bit mapped TrueType font for use. a = Font ID (1-9 bb = Horizontal Expansion (01-12) cc = Vertical Expansion (01-12) dd = Character pitch (01-99) eeee = Number of characters ff...f = Data to be printed using font	Page 5-
BJS	**Expanded Memory Status.** Reports the status of the currently active Memory Card to the host by printing a status label.	Page 5-
BJTaa,bb,cc, dd,ee,fff,gg..g	**TrueType Font Recall.** Recalls a previously stored bit mapped TrueType font for use. aa = Font ID (01-99 bb = Horizontal Expansion (01-12) cc = Vertical Expansion (01-12) dd = Reserved, always 00 ee = Character pitch (01-99) f f f f = Number of characters gg...g = Data to be printed using font	Page 5-
CCa	**Memory Area Select**. Selects the Memory area for all following Expanded Memory commands. a = 1 Memory Area 1 b = 2 Memory Area 2	Page 5-
GCaaa	**Recall BMP Graphic**. Recalls BMP graphic files stored in Expanded Memory.	Page 5-
GIabbbcccddd ee...e	**Store Custom Graphics**. Stores a graphic image in the memory card to be called later for printing on a label. a = Specifies format of data stream to follow B Binary H Hexadecimal bbb = Number of horizontal 8 x 8 blocks ccc = Number of vertical 8 x 8 blocks ddd = Graphics storage number (001-999) ee...e = Data to describe the graphic image	Page 5-
GRccc	**Recall Custom Graphics**. Recalls for printing the graphic image stored by the GI command. ccc = Storage number (001-999)	Page 5-

INSTRUCTION	DESCRIPTION	
GTaaa,bbbbb, nn. . . n	**Store BMP Graphics**. Stores BMP files in Expanded Memory. aaa = Storage area number (001 to 999) bbbbb= Size of BMP file in bytes nn...n = Data	Page 5-
PIaaa,bbbbb, cc...c	**Store PCX Graphics File**. Stores a PCX graphic file. aaa = Storage number (001-999) bbbbb= Number of bytes in the file to be stored.	Page 5-
PYaaa	**Recall PCX Graphics File**. Recalls a PCX graphics file. aaa = The storage number assigned to the file (001-999)	Page 5-
YR,aaa /D,bb,cc...c	**Recall Format/Field**. To recall a field from a format previously stored in the memory card. aaa = Number of format to be recalled (001 to 999) bb = Number of field to be recalled (01-99) cc...c = Data to be placed in field.	Page 5-
YS,aaa /Nbb,cc	**Store Format/Field**. To store a field in a format in the memory card. aaa = Format number (001 -999) bb = Field number (01-99) cc = Number of characters in the field	Page 5-
&R,aa	**Recall Form Overlay**. Recalls a label image previously stored in Expanded Memory. aa = Storage number (00 to 99).	Page 5-
&S,aa,bbbb,cccc	**Store Form Overslay**. Storesa label image in Expanded Memory. aa = Storage number (00 to 99) bbbb = Horizontal size of window to be stored (50 to Hmax) cccc = Vertical size of window to be stored (50 to Vmax)	Page 5-
*a,bbb	**Clear Card Memory**. Clears individual memory and buffer areas. a = Memory section to be cleared G SATO graphic files (001-999) P PCX graphic file (001-999) F Stored formats (001-999) O TrueType fonts, memory card (001-009) bbb = Storage number	Page 5-

INSTRUCTION	DESCRIPTION	PAGE

Printer Configuration Commands

I2abcde	**Serial Interface.** Sets the operating parameters for the Serial RS232 interface. Sets the default printer configuration in Flash ROM. See Serial Interface Parameters command in the Configuration Commands of Section 5: Programming Reference of this manual for details.	Page 5-
IGa	**Sensor Type**. Selects the sensor type. a = 0 Reflective (Eye-Mark) sensor. 1 Transmissive (See-Thru) sensor 2 Sensor not used	Page 5-
LD,a,b,c,d,e, f,g,i, j j	**Download Protocol Command Codes**. Downloads a user defined set of Alternate Protocol Command Codes. See Appendix E for details on the proper usage of this command.	Page 5-
PCaa,bb PCF,a,.....z	**Printer Setting**. Sets the default printer configuration in Flash ROM. See Printer Setting command in the Configuration Commands of Section 5: Programming Reference of this manual for details.	Page 5-
PHa	**Print Type.** Selects the thermal printing method. a = 0 Thermal transfer printing 1 Direct thermal printing	Page 5-
PMa	**Print Mode.** Selects desired backfeed operation. a = 0 No backfeed, continuous operation 1 Tear-Off 2 Cut, backfeed after print 3 Cut, backfeed before print 4 Cut, no backfeed 7 Dispense, backfeed after print 8 Dispense, backfeed before print	Page 5-
POabcc	**Pitch Offset.** Sets the pitch type, direction and offset to be used a = 0 Cutter 1 Dispense 2 Tear-Off 3 Continuous b = + Positive offset - Negative offset cc = 00 to 99, offset value in dots.	Page 5-

INSTRUCTION	DESCRIPTION	PAGE

Legacy Commands

These commands are provided for legacy applications that use command streams created for older SATO printers. It is not recommended that these commands be used for new applications.

AX	**Expanded Print Length**. This command sets the printer to the Expanded print length (14 inches). EX0 is the recommended replacement.
N	**Rotate, Moving Base Reference Point**. Sets the original base reference point and returns printing to normal orientation. % is the recommended replacement.
R	**Rotate, Moving Base Reference Point**. Rotates the printing of all subsequent images by 90 degrees counterclockwise each time it is used. Also moves the base reference point. % is the recommended replacement.

APPENDIX B.
BAR CODE SPECIFICATIONS

BAR CODE SYMBOLOGIES

This section contains detailed information on the printing of bar codes on the CL Series “e” printers. Information on printing the following bar code symbologies is provided:

- Codabar
- Code 39
- Interleaved 2 of 5
- UPC-A/EAN-13
- EAN-8
- Industrial 2 of 5
- Matrix 2 of 5
- Code 128
- MSI
- Code 93
- UPC-E
- UPC Supplements(Bookland)
- UCC-128
- Postnet
- Data Matrix
- Maxicode
- PDF417

Codabar

Command Structure

1:3 ratio <ESC>**B0bbcccd (data) d**
2:5 ratio <ESC>**BD0bbcccd (data) d**
1:2 ratio <ESC>**D0bbcccd (data) d**

bb = Width of narrow element in dots (01-12)
ccc = Bar height in dots (001-600)
d = Required Start and Stop character (A, B, C, or D)
(data) = Bar code data (alphanumeric)

Character Set

0-9, -,$,:,/,+
A, B, C, D (Start/Stop characters)

Density Table

Printer Model	Narrow/ Wide Ratio	Value of "bb"	"X" Dimension (mils)	Density (char/inch)
CL412e CL612e	1:3	01	3.3	25.0
	1:3	02	6.7	12.6
	2:5	01	6.7	13.6
	1:2	02	3.3	15.1
CL408e CL608e	1:3	01	5.0	16.9
	1:3	02	10.0	8.5
	2:5	01	10.0	9.2
	1:2	02	5.0	10.2

Example

<ESC>H0400<ESC>V0025<ESC>B002100A12345B
<ESC>H0440<ESC>V0135<ESC>XS12345

Notes

You must add the appropriate (A, B, C or D) Start and Stop characters to the data string. The printer does not automatically add them when printing.

Code 39

Command Structure

1:3 ratio: <ESC>**B1bbccc* (data) ***
2:5 ratio: <ESC>**BD1bbccc* (data) ***
1:2 ratio: <ESC>**D1bbccc* (data) ***

bb = Width of narrow element in dots (01-12)
ccc = Bar height in dots (001-600)
* = Required Start and Stop character (asterisk)
(data) = Bar code data (alphanumeric)

Character Set

0-9, A-Z, Space, $, %, +, -, .,/
* (Start/Stop character)

Density Table

Printer Model	Narrow/ Wide Ratio	Value of "bb"	"X" Dimension (mils)	Density (char/inch)
CL412e CL612e	1:3	01	3.3	18.8
	1:3	02	6.7	9.5
	2:5	01	6.7	10.3
	1:2	01	3.3	23.1
	1:2	02	6.7	11.5
CL408e CL608e	1:3	01	5.0	12.7
	1:3	02	10.0	6.4
	2:5	01	10.0	7.0
	1:2	01	5.0	15.6
	1:2	02	10.0	7.8

Example

<ESC>H0100<ESC>V0025<ESC>B103100*CODE 39*
<ESC>H0230<ESC>V0130<ESC>XS*CODE 39*

Notes

You must add the "*" Start/Stop characters to the data stream. The printer does not add them automatically.

Interleaved Two of Five (I 2/5)

Command Structure

1:3 ratio: <ESC>**B2bbccc (data)**
2:5 ratio: <ESC>**BD2bbccc (data)**
1:2 ratio: <ESC>**D2bbccc (data)**

bb = Width of narrow element in dots (01-12)
ccc = Bar height in dots (001-600)
(data) = Bar code data (numeric); must be an even number of digits or else the printer will add a leading zero; start and stop code are provided by the printer

Character Set

0-9 (numeric only)

Density Table

Printer Model	Narrow/ Wide Ratio	Value of "bb"	"X" Dimension (mils)	Density (char/inch)
CL412e CL612e	1:3	01	3.3	33.4
	1:3	02	6.7	16.7
	2:5	01	6.7	18.8
	1:2	01	3.3	21.4
	1:2	02	6.7	14.3
CL408e CL608e	1:3	01	5.0	22.6
	1:3	02	10.0	11.3
	2:5	01	10.0	12.7
	1:2	01	5.0	14.5
	1:2	02	10.0	9.7

Example

<ESC>H0100<ESC>V0100<ESC>B20310045676567
<ESC>H0140<ESC>V0210<ESC>XM4567 6567

Notes

To add horizontal guard bars to the top and bottom of the bar code, use the Line and Box command.

UPC-A/EAN-13

Command Structure

<ESC>**B3bbccc (data)**
<ESC>**D3bbccc (data)**
<ESC>**BD3bbccc (data)**

bb = Width of narrow element in dots (01-12)
ccc = Bar height in dots (001-600)
(data) = Bar code data (numeric); must be exactly 13 digits. For UPC-A, the first digit must be a zero and the last 11 digits are the actual UPC-A data followed by a check digit.

To select UPC-A, 11 digits of data is sent. The printer adds a “0” and automatically generates the check digit. If 12 digits of data are sent, the printer assumes an EAN-13 symbol and automatically generates the check digit. The last digit of the bar code data is a modulo 10 check digit. If 13 digits of data are sent to the printer, the check digit is not created and must be supplied by the programmer. It must be the last character in the 13 digit string and can be determined by using the calculations outlined below.

Character Set

0-9 (numeric only)

Density Table

Printer Model	Value of “bb”	Narrow Bar Width (mils)	Magnification Factor
CL412e CL612e	02	6.7	Below Minimum
	03	10.0	75%
	04	13.3	100%
CL408e CL608e	02	10.0	75%
	03	15.0	112%
	04	20.0	150%

Notes

D3 provides guide bars that extend longer than the rest of the bar code. BD3 provides guide bars and the human readable text below the symbol.

Example

<ESC>H0100<ESC>V0375<ESC>BD30215001234567890

Calculating the Mod 10 Check Digit

If you wish to encode the UPC-A data “01234567890”, follow these steps to find the correct check digit.

ODD	0		2		4		6		8		0	
EVEN		1		3		5		7		9		CD

1. First add all the numbers in the ODD positions.
   i.e., 0+2+4+6+8+0 = 20

2. Multiply the result of Step 1 by 3.
   i.e., 20 x 3 = 60

3. Add up all the numbers in the EVEN positions.
   i.e., 1+3+5+7+9 = 25

4. Add the result of Step 2 to that of Step 3.
   i.e., 60 + 25 = 85

5. Subtract the result of Step 4 from the next highest increment of 10.
   i.e., 90 - 85 = 5

6. The correct Modulo 10 check digit for the 11 digit string “01234567890” is 5.

EAN-8

Command Structure

<ESC>**B4bbccc (data)**
<ESC>**D4bbccc (data)**

bb = Width of narrow element in dots (01-03)
ccc = Bar height in dots (001-600)
(data) = Bar code data (numeric); must be exactly 8 digits.

Character Set

0-9 (numeric only)

Density Table

Printer Model	Value of "bb"	Narrow Bar Width (mils)	Magnification Factor
CL412e CL612e	02	6.7	Below Minimum
	03	10.0	75%
	04	13.3	100%
CL408e CL608e	02	10.0	75%
	03	15.0	112%
	04	20.0	150%

Notes

1. D4 provides guide bars that extend longer than the rest of the bar code and the human readable text below the symbol.
2. The check digit is automatically calculated for EAN-8.

Example

<ESC>H0400<ESC>V0375<ESC>BD4031001234567

Industrial Two of Five

Command Structure

1:3 ratio: **B5bbccc (data)**
2:5 ratio: **BD5bbccc (data)**
1:2 ratio: **D5bbccc (data)**

bb	=	Width of narrow element in dots (01-12)
ccc	=	Bar height in dots (001-600)
(data)	=	Bar code data (numeric); must be an even number of digits
or		else the printer will add a leading zero

Character Set

0-9 (numeric only)

Notes

To add horizontal guard bars to the top and bottom of the bar code, use the Line and Box command.

Example

<ESC>H0100<ESC>V0600<ESC>BD50310012345
<ESC>H0300<ESC>V0710<ESC>XS12345

Matrix Two of Five

Command Structure

1:3 ratio: <ESC>**B6bbccc (data)**
2:5 ratio: <ESC>**BD6bbccc (data)**
1:2 ratio: <ESC>**D6bbccc (data)**

bb = Width of narrow element in dots (01-12)
ccc = bar height in dots (001-600)
(data) = Bar code data (numeric only); must be an even number of digits or else the printer will add a leading zero.

Character Set

0-9 (numeric only)

Notes

To add horizontal guard bars to the top and bottom of the bar code, use the Line and Box command.

Example

<ESC>H0100<ESC>V0775<ESC>BD60310012345
<ESC>H0230<ESC>V0885<ESC>XS12345

Code 128

Command Structure <ESC>**BGbbcccdd (data)**

bb = Width of narrow element in dots (01-12)
ccc = Bar height in dots (001-600)
dd = Start code to specify initial subset of bar code data
>G Subset A Start code
>H Subset B Start code
>I Subset C Start code
(data) = Includes bar code data and subset Shift codes; Shift codes are used to change the subset type within the bar code data.
Shift codes:
>E Subset A Shift code
>D Subset B Shift code
>C Subset C Shift code

Character Set See Code 128 Character Table on Page B-18

Density Table

Printer Model	Value of "bb"	"X" Dimension (mils)	Density (char/inch)	
			Subsets A, B	Subset C
CL412e CL612e	01	3.3	27.3	54.7
	02	6.7	13.6	27.2
	03	10	9.1	18.3
CL408e CL608e	01	5.0	18.2	36.5
	01	10.0	9.1	18.3
	03	15.0	13.8	12.2

Example The following will start in Subset A for the characters "AB", shift to Subset B for "789", then shift to Subset C for "123456".

<ESC>H0200<ESC>V0550<ESC>BG03100>GAB>B789>C123456
<ESC>H0310<ESC>V655<ESC>XSAB789123456

MSI

Command Structure

1:3 ratio: <ESC>**BAbbccc (data) d**
2:5 ratio <ESC>**BDAbbccc (data) d**
1:2 ratio <ESC>**DAbbccc (data) d**

bb	=	Width of narrow element in dots (01-12)
ccc	=	Bar height in dots (001-600)
(data)	=	Bar code data (numeric); maximum of 15 digits
d	=	Required check digit

Character Set

0-9 (numeric only)

Example

<ESC>H0100<ESC>V0950<ESC>BA03100123455
<ESC>H0170<ESC>V1060<ESC>XS12345

Code 93

Command Structure

1:3 ratio: <ESC>**BCbbcccdd (data)**

bb = Width of narrow element in dots (01-12)
ccc = Bar height in dots (001-600)
dd = Length of data (number of digits, 00-99)
(data) = Bar code data (alphanumeric); length must match value of parameter “dd”; check digit is supplied by printer

Character Set

0-9, A-Z, -, ., Space, $, /, +, %

Density Table

Printer Model	Nar-row/Wide Ratio	Value of “bb”	“X” Dimension (mils)	Density (char/inch)
CL412e CL612e	1:3	01	3.3	33.3
	1:3	02	6.7	16.7
	1:3	03	10	11.1
CL408e CL608e	1:3	01	5.0	22.5
	1:3	02	10.0	11.3
	1:3	03	15	7.5

Example

<ESC>H0100<ESC>V1125<ESC>BC03100081234ABCD
<ESC>H0155<ESC>V1240<ESC>XS1 234ABCD

UPC-E

Command Structure

<ESC>**BEbbccc (data)**
<ESC>**DEbbccc (data)**

bb = Width of narrow element in dots (01-03)
ccc = Bar height in dots (001-600)
(data) = Bar code data (numeric); must be exactly 6 digits

Character Set

0-9 (numeric only)

Density Table

Printer Model	Value of "bb"	Narrow Bar Width (mils)	Magnification Factor
CL412e CL612e	02	6.7	Below Minimum
	03	10.0	75%
	04	13.3	100%
CL408e CL608e	02	10.0	75%
	03	15.0	112%
	04	20.0	150%

Notes

Command **DE** provides guide bars that extend longer than the rest of the bar code.

Example

<ESC>H0400<ESC>V0550<ESC>DE03100123456
<ESC>H0375<ESC>V0600<ESC>OB0
<ESC>H0408<ESC>V0655<ESC>OB123456

Bookland (UPC/EAN Supplements)

Command Structure <ESC>**BFbbccc (data)**

bb = Width of narrow element in dots (01-03)
ccc = Bar height in dots (001-600)
(data) = Bar code data (numeric); must be exactly 2 or 5 digits

Character Set 0-9 (numeric only)

Density Table

Printer Model	Value of "bb"	Narrow Bar Width (mils)	Magnification Factor
CL412e CL612e	02	6.7	Below Minimum
	03	10.0	75%
	04	13.3	100%
CL408e CL608e	02	10.0	75%
	03	15.0	112%
	04	20.0	150%

Example

<ESC>H0325<ESC>V0725<ESC>D30315009827721123
<ESC>L0101<ESC>H0295<ESC>V0800<ESC>OB0
<ESC>H0340<ESC>V0878<ESC>OB98277
<ESC>H 0480<ESC>V0878<ESC>OB21123
<ESC>H640<ESC>V0760<ESC>BF0313021826
<ESC>H655<ESC>V0730<ESC>OB21826

UCC-128

Command Structure <ESC>**Blbbcccd (data)**

bb = Width of the narrow elements in dots (01 to 12)
ccc = Bar height in dots (001 to 600)
d = Placement of human readable text
0 None
1 Text at top of bar code
2 Text at bottom of bar code
(data) = 17 digits made up of the following:
1st digit = Container type
digits 2-8, Shipper identification
digits 9-17, Container Sequential number
Note: The Container Sequential number is not automatically sequenced by the printer.

Character Set See Code 128 Character Table on Page B-18

Density Table See Code 128, Page B-10

Notes

1. The Start, Function, Stop and Extension codes will be created by the printer and added automatically.

2. The internal Modulo 10 check character will be automatically created and added by the printer. The overall Code 128 symbol check character will be automatically created by the printer and added.

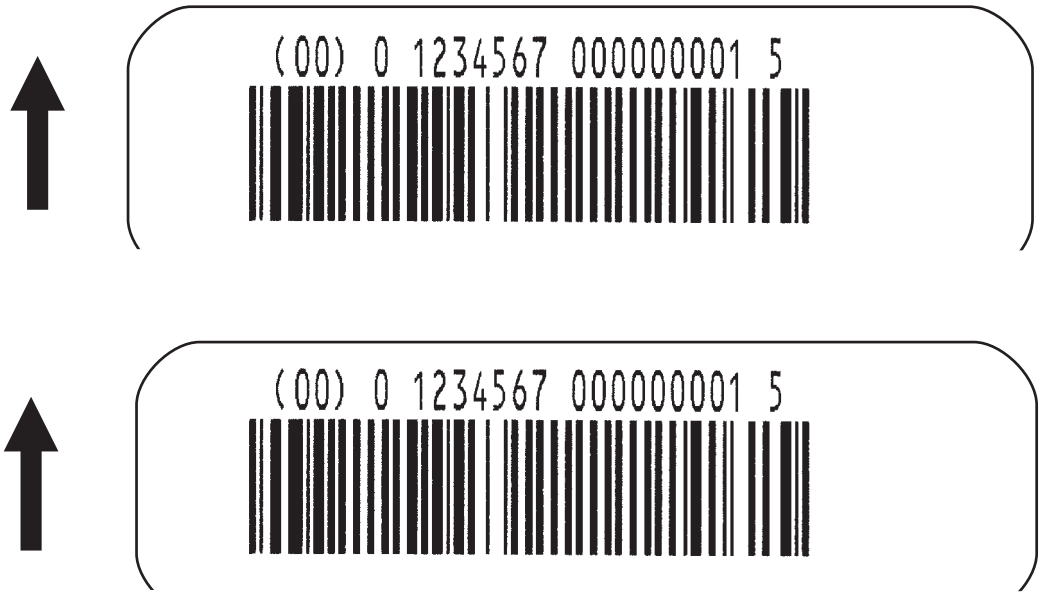
3. The automatically created human readable text will be created according to the following rules:

   - The spacing between the bar code and the text is fixed at 10 dots (.050 inches).
   - If the width of the human readable text is wider than the bar code, it will start at the same position as the bar code and extend past the right of the bar code.
   - If the width of the human readable text is less than the bar code, it will be centered on the bar code.
   - The automatically generated human readable font is OCR-B.
   - If any part of the human readable text extends outside the printable area, none of it will be printed. Care should be exercised when placing the bar code to allow for any automatically created human readable text.

Example

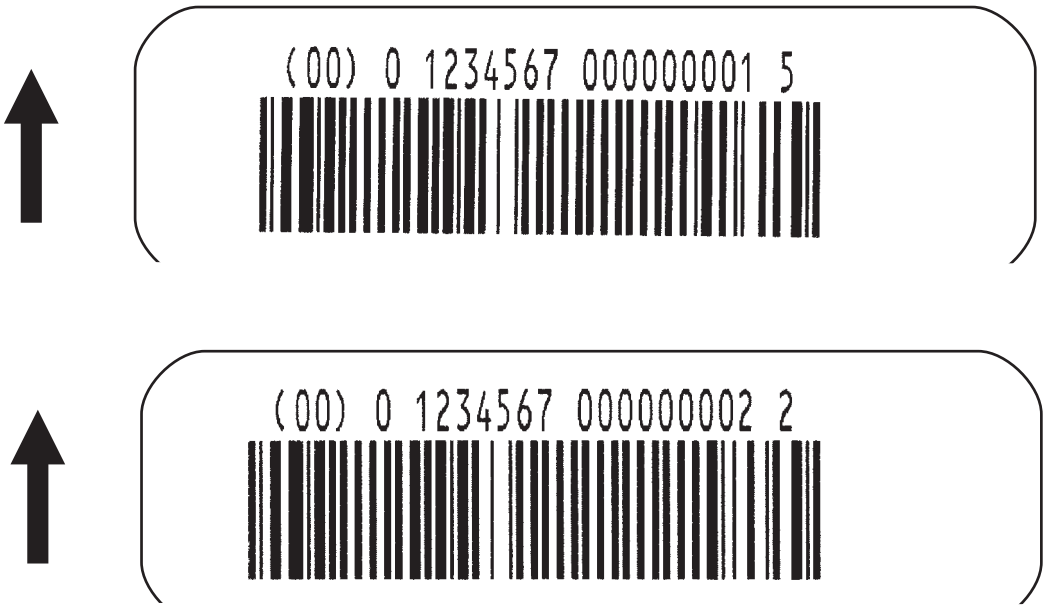
Without incrementing

```
<ESC>A
<ESC>H0100<ESC>V0100<ESC>BI0415010123456700000000 1
<ESC>Q2<ESC>Z
```



With incrementing

```
<ESC>A
<ESC>H0100<ESC>V0100<ESC>F001+001
<ESC>BI0415010123456700000000 1
<ESC>Q2<ESC>Z
```



Postnet

Command Structure <ESC>**BP (data)**

data = 5 digits ZIP
= 6 digits for Postnet 37
= 9 digits for ZIP+4
= 11 digits for Dlelivery Point Bar Code

Character Set 1-9 (numeric only)

Notes

1. Frame bits and check digits added automatically by printer.
2. Bar code width and height are fixed and cannot be changed.
3. If the number of digits sent to the printer as data does not match one of the formats specified above (i.e. 5, 6, 9 or 11), the command is ignored and nothing will be printed.
4. If a "–" is included in the data stream (i.e. 84093-1565), it is ignored.

Example

```
<ESC>H0100<ESC>V0120<ESC>BP94089
<ESC>H0100<ESC>V0160<ESC>BP123456
<ESC>H0100<ESC>V0200<ESC>BP123456789
<ESC>H0100<ESC>V0240<ESC>BP12345678901
```

Data Matrix

Command Structure

Data Format <ESC>**BXaabbccddeeefffghh**

aa = Format ID. 01-06 or 11-16. The values 07 and 17 will not be accepted by the printer.
bb = Error correction level. 00 ,01, or 04-14. The values 02, 03 or values of 15 or greater will be processed as a 00.
cc = Horizontal cell size. 03 - 12 dots/cell.
dd = Vertical cell size. 03 - 12 dots/cell.
eee = Number of cells in one line. Must use 000 to optimize.
fff = Number of cell lines. Must use 000 to optimize.
g = Mirror Image
  0 = Normal Print
  1 = Reverse Print
hh = Guide Cell Thickness. 01-15. 01 indicates normal type.

Sequential Numbering <ESC>**FXaaabcccdddeee**

aaa = Number of duplicate labels to be printed (001 - 999)
b = Increment or Decrement
  + = Increment
  - = Decrement
ccc = Increment/Decrement Steps (001 - 999)
ddd = Sequential numbering start position (001 - 999) Referenced to left side.
eee = Incremented data length measured from start position (001 - 999)

Print Data <ESC>**DCxxx...x**

xx...x = Data, maximum of 500 characters

Character Set

ECC Level (bb)	Format ID (aa)					
	01	**02**	**03**	**04**	**05**	**06**
00 (ECC000)	500	452	394	413	310	271
05 (ECC050)	457	333	291	305	228	200
08 (ECC080)	402	293	256	268	201	176
10 (ECC100)	300	218	190	200	150	131
14 (ECC140)	144	105	91	96	72	83
20 (ECC200)		Numeric			3116	
		Alphanumeric			2336	
		ISO 8-bit (01_H - FF_H)			1556	

ID NUMBER	CHARACTER SET	ENCODING SCHEME
16 Bit CRC		
01	Numeric, Space	Base 11
02	Upper Case Alpha, Space	Base 27
03	Upper Case Alpha, Space,Comma, Period, Slash, Minus	Base 41
04	Upper Case Alphanumeric, Space	Base 37
05	ASCII 7-bit, Full Keyboard (20_H - $7F_H$)	ASCII
06	ISO 8-bit, International (20_H - FF_H)	8-Bit

Notes

See AIM USA Technical Specification Data Matrix for information on the structure of this symbology.

Example

<ESC>V0100<ESC>H0100
<ESC>BX05051010000000001
<ESC>DCDATA MATRIX DATA MATRIX

Maxicode

Command Structure <ESC>**BVa,b,c,ddddddddd,eee,fff,gggg.....<ESC>**

a = Position of Maxicode symbol within the set, when used in a structured append format 1~8.
b = Total number of Maxicode symbols in the set, when used in a structured format 1~8.
c = 2 For Mode 2 Structured Carrier Message for Domestic U.S. UPS shipments
3 For Mode 3 Structured Carrier Message for International UPS shipments
4 Standard symbol
5 Not currently supported
6 Reader programming
ddd..ddd 9 digit numeric Postal Code
eee = 3 digit numeric Country Code
fff = 3 digit numeric Service Class
gg..g = Data, terminated by <ESC>

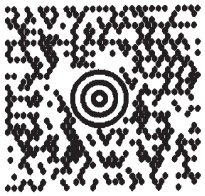
Character Set

MODE	POSTAL CODE	COUNTRY CODE	SERVICE CLASS	MESSAGE LENGTH
2	9 digits max numeric only	3 digits max numeric only	3 digits max numeric only	84 characters alphanumeric
3	6 digits fixed alphanumeric	3 digits max numeric only	3 digits max numeric only	84 characters alphanumeric
4 6	“000000“ fixed data	“000“ fixed data	“000“ fixed data	91 characters alphanumeric

Notes See AIM I.S.S specification for information on the structure of this symbology.

Example

```
<ESC>A<ESC>V0100<ESC>H0100
<ESC>BV1,1,2,123456789,840,001,[)<RS>01<GS>961Z01547089
<GS>UPSN<GS>056872<GS>349<GS>99999999<GS>001/005
<GS>029<GS>N<GS><GS>LENEXA<GS>KS<RS><EOT>
<ESC>Q001<ESC>Z
```



PDF417

Command Structure <ESC>**BFaabbcddeeffffnnn...n**

aa = Minimum module dimension (03-09 dots). Will not print if values of 01, 02 or greater than 10 are specified.
bb = Minimum module pitch dimension (04-24 dots). Will not print if values of 01, 02, 03 or greater than 25 are specified.
c = Security (error detection) Level (1-8).
dd = Code words per line (01-30). If 00 is specified for both dd and ee, the printer automatically optimizes the number of rows per symbol.
ee = Rows per symbol (00 or 03-40). If 00 is specified for both dd and ee, the printer automatically optimizes the number of rows per symbol.
ffff = Number of characters to be encoded (0001-2700).
gg = If not specified, standard PDF417
M Micro PDF417
T Truncated PDF417
nn...n = Data to be printed.

Character Set ASCII 128 character set plus PC437 Extended Character set.

Notes See AIM USA Uniform Symbology Specification PDF417 for information on the structure of this symbology.

Example <ESC>V0100<ESC>H0100<ESC>BK0607400000021PDF417 PDF417 PDF417

CODE 128 CHARACTER TABLE

The Code 128 Table lists 105 data values for the three subsets: A, B, and C. Each subset column displays either a single column of data or a double column of data.

- If the subset column displays a single column of data, that is the data to be entered to produce the result.
- If the subset column displays a double column of data, the first column contains the desired output, and the second column contains the actual characters to be entered.

For example, look at value 99 in the table:

If you are currently using Subset A or Subset B, you can change to Subset C by encoding "**>C**".

VALUE	SUBSET A	SUBSET B	SUBSET C
99	Subset C >C	Subset C >C	99
100	Subset B >D	FNC4 >D	Subset B >D
101	FNC4 >E	Subset A >E	Subset A >E
102	FNC1 >F	FNC1 >F	FNC1 >F

Note: When Subset C is chosen, you must specify an even number of data positions because of the interleaved encodation method.

Code 128 Character Table

VALUE	SUBSET A	SUBSET B	SUBSET C	VALUE	SUBSET A	SUBSET B	SUBSET C
0	SP	SP	00	36	D	D	36
1	!	!	01	37	E	E	37
2	“	”	02	38	F	F	38
3	#	#	03	39	G	G	39
4	$	$	04	40	H	H	40
5	%	%	05	41	I	I	41
6	&	&	06	42	J	J	42
7	‘	‘	07	43	K	K	43
8	(	(	08	44	L	L	44
9	)	)	09	45	M	M	45
10	*	*	10	46	N	N	46
11	+	+	11	47	O	O	47
12	,	,	12	48	P	P	48
13	-	-	13	49	Q	Q	49
14	.	.	14	50	R	R	50
15	/	/	15	51	S	S	51
16	0	0	16	52	T	T	52
17	1	1	17	53	U	U	53
18	2	2	18	54	V	V	54
19	3	3	19	55	W	W	55
20	4	4	20	56	X	X	56
21	5	5	21	57	Y	Y	57
22	6	6	22	58	Z	Z	58
23	7	7	23	59	[	[	59
24	8	8	24	60	\	\	60
25	9	9	25	61	]	]	61
26	:	:	26	62	^	^	62
27	;	;	27	63	__	__	63
28	<	<	28	64	NUL >(space)	‘ >(space)	64
29	=	=	29	65	SOH >!	a >!	65
30	>	>	30	66	STX >"	b >"	66
31	?	?	31	67	ETX >#	c >#	67
32	@	@	32	68	EOT >$	d >$	68
33	A	A	33	69	ENQ >%	e >%	69
34	B	B	34	70	ACK >&	f >&	70
35	C	C	35	71	BEL >’	g >’	71

Code 128 Character Table (cont'd)

VALUE	SUBSET A	SUBSET B	SUBSET C	VALUE	SUBSET A	SUBSET B	SUBSET C
72	BS >(	h >(	72	89	EM >9	y >9	89
73	HT >)	i >)	73	90	SUB >:	z >:	90
74	LF >*	j >*	74	91	ESC >;	{ >;	91
75	VT >+	k >+	75	92	FS ><	| ><	92
76	FF >,	l >,	76	93	GS >=	} >=	93
77	CR >-	m >-	77	94	RS >>	~ >>	94
78	SO >.	n >.	78	95	US >?	DEL >?	95
79	SI >/	o >/	79	96	FNC3 >@	FNC3 >@	96
80	DLE >0	p >0	80	97	FNC2 >A	FNC2 >A	97
81	DC1 >1	q >1	81	98	SHIFT >B	SHIFT >B	98
82	DC2 >2	r >2	82	99	Subset C >C	Subset C >C	99
83	DC3 >3	s >3	83	100	Subset B >D	FNC4 >D	Subset B >D
84	DC4 >4	t >4	84	101	FNC4 >E	Subset A >E	Subset A >E
85	NAK >5	u >5	85	102	FNC1 >F	FNC1 >F	FNC1 >F
86	SYN >6	v >6	86	103	SUBSET A	START CODE >G	
87	ETB >7	w >7	87	104	SUBSET B	START CODE >H	
88	CAN >8	x >8	88	105	SUBSET C	START CODE >I	

APPENDIX C.
CUSTOM CHARACTERS AND GRAPHICS

CUSTOM-DESIGNED CHARACTER EXAMPLE

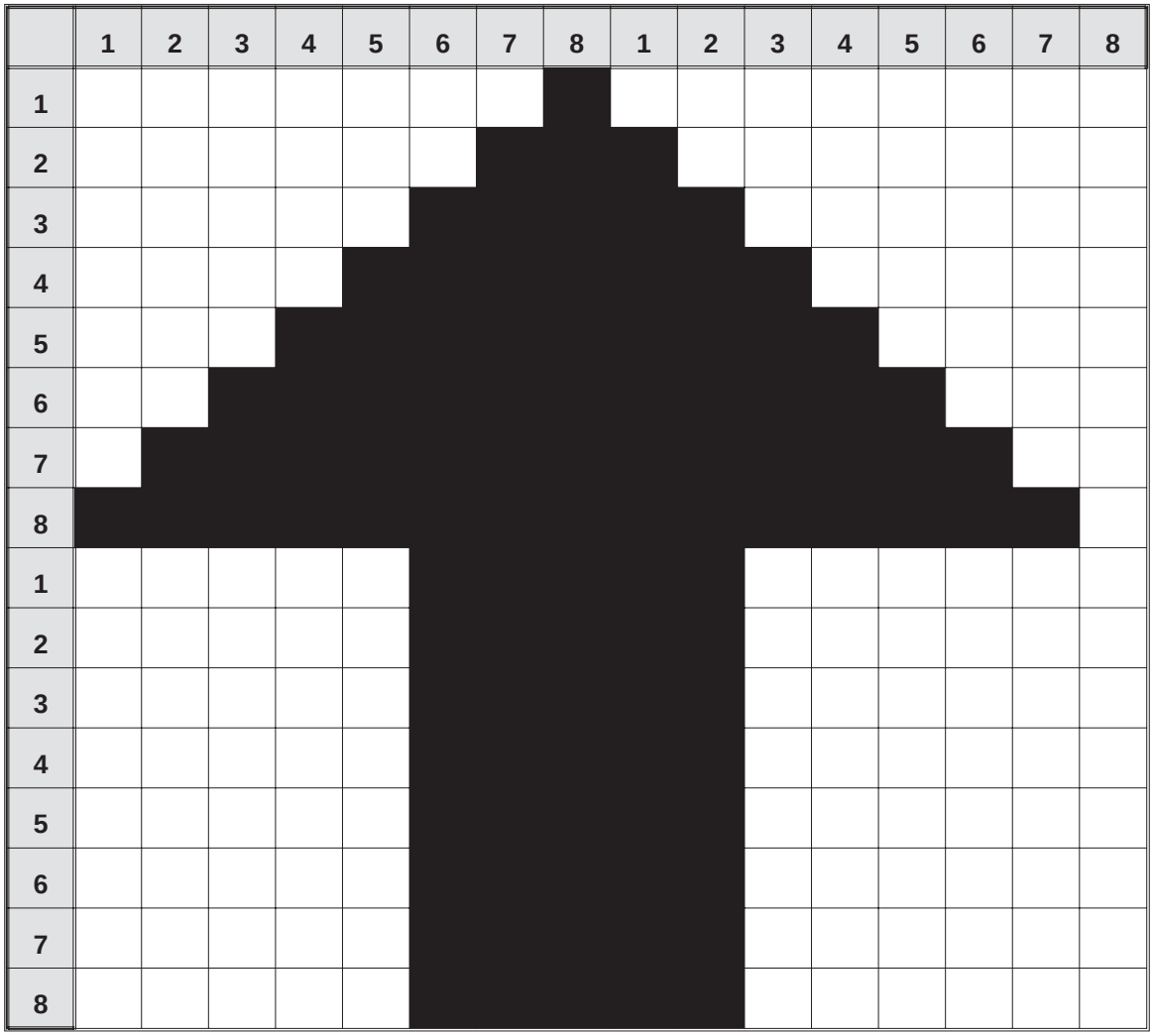
The following example is presented to help understand the use of the Custom-Designed Characters command. It demonstrates the design and printing of an "arrow" in a 16 x 16 matrix.

1. Determine which matrix size to use

   - 16 dot x 16 dots
   - 24 dots by 24 dots

2. Lay out a grid and draw the image on the grid.

   - Each square represents one dot
   - Blacken squares for each printed dot



3. Transfer the image into two bit map representations and then into hexadecimal or binary format.

ROW	BIT MAP	HEX
1	0000 0001 0000 0000	01 00
2	0000 0011 1000 0000	03 80
3	0000 0111 1100 0000	07 C0
4	0000 1111 1110 0000	0F E0
5	0001 1111 1111 0000	1F F0
6	0011 1111 1111 1000	3F F8
7	0111 1111 1111 1100	7F FC
8	1111 1111 1111 1110	FF FE
9	0000 0111 1100 0000	07 C0
10	0000 0111 1100 0000	07 C0
11	0000 0111 1100 0000	07 C0
12	0000 0111 1100 0000	07 C0
13	0000 0111 1100 0000	07 C0
14	0000 0111 1100 0000	07 C0
15	0000 0111 1100 0000	07 C0
16	0000 0111 1100 0000	07 C0

4. To store the custom designed character in memory using a hexadecimal data stream, the command would be:

<ESC>A
<ESC>**T1H3F**0100038007C00FE01FF03FF87FFCFFFE07C007C007C007C007C007C007C007C0<ESC>Z

Note: This should be a continuous data string without any CR or LF characters.

5. To recall the custom character from memory, send the following code to the printer. Note that you can print other data as well. Also note how the character size was expanded using the <ESC>L command.

<ESC>A
<ESC>L0505<ESC>H0150<ESC>V100<ESC>**K1H903F**
<ESC>L0505<ESC>H0600<ESC>V100<ESC>**K1H903F**
<ESC>L0303<ESC>H0125<ESC>V0250<ESC>MTHIS SIDE UP !
<ESC>Q1
<ESC>Z

6. To store the custom designed character in memory using a binary data stream, the command would be:

<ESC>A
<ESC>**T1B3F** 01_H 00_H 03_H 80_H 07_H $C0_H$ $0F_H$ $E0_H$ $1F_H$ $F0_H$ $3F_H$ $F8_H$ $7F_H$ FC_H FF_H FE_H 07_H $C0_H$ 07_H $C0_H$ 07_H $C0_H$ 07_H $C0_H$ 07_H $C0_H$ 07_H $C0_H$ 07_H $C0_H$ 07_H $C0_H$
<ESC>Z

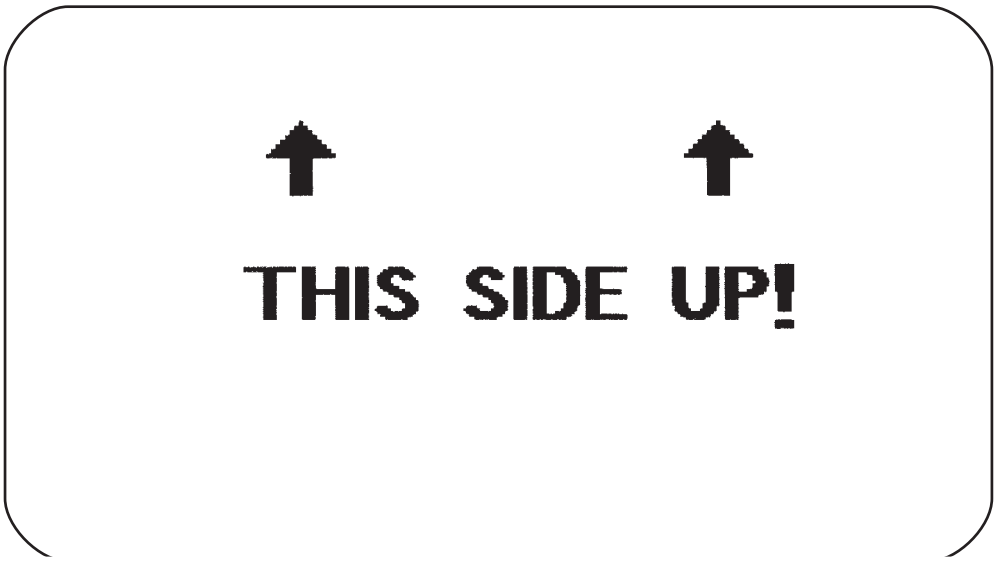
NOTE: Spaces are shown between hexidecimal values in the above example for clarity only and *are not* included in the data string.

Note that the data stream is only half as long as the hexadecimal format. This is because we can send the binary equivalent of "11111111" (represented above in its hexidecimal value of FF_H*), for example, using one eight bit word while it takes two eight bit words to transmit the hexadecimal equivalent "F" and "F". To send binary characters using BASIC, the expression "CHR (&HFF) will send the binary equivalent of FF (i.e., 11111111).*

6. To recall the custom character from memory, send the following code to the printer:

```
<ESC>A
<ESC>L505<ESC>H0150<ESC>V100<ESC>K1B903F
<ESC>L505<ESC>H0600<ESC>V100<ESC>K1B903F
<ESC>L0303<ESC>H0125<ESC>V0250<ESC>XMTHIS SIDE UP !
<ESC>Q1
<ESC>Z
```

The printer output for both the hexadecimal and binary format examples is:



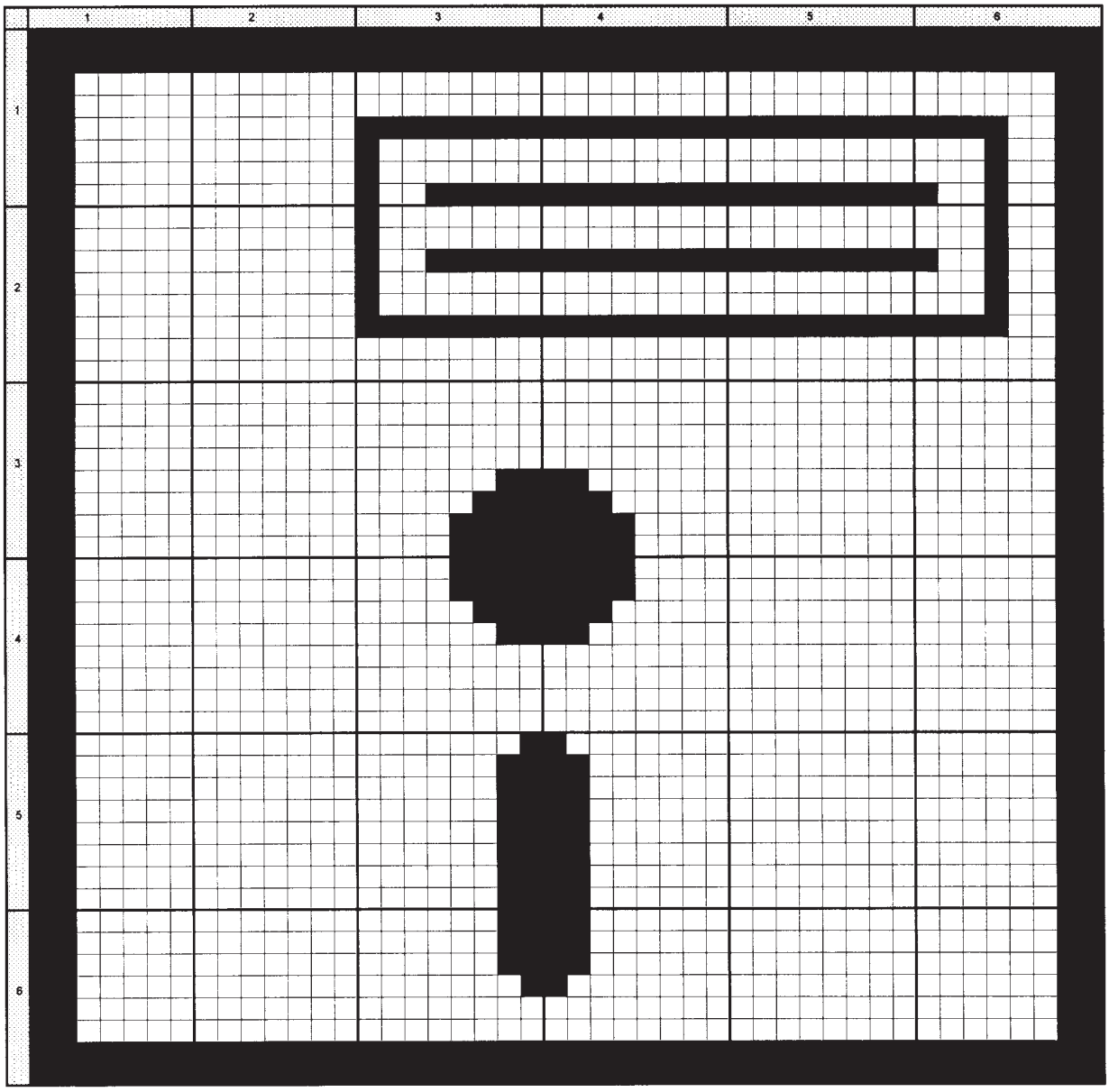
CUSTOM GRAPHICS EXAMPLE

The following example is presented to help you understand the use of the Custom Graphics command. It demonstrates the design and printing of a “diskette” in a 48 x 48 matrix.

1. Determine the matrix size for the graphic. It must be in 8 dot by 8 dot blocks. The example here has six blocks horizontally and six blocks vertically (48 x 48).

2. Lay out a grid and draw the image on the grid.

    - Each square represents one dot
    - Blacken squares for each printed dot



3. Transfer the image into a bit map representation and then into hexadecimal format:

BIT MAP						HEXADECIMAL FORMAT					
1	2	3	4	5	6	1	2	3	4	5	6
11111111	11111111	11111111	11111111	11111111	11111111	FF	FF	FF	FF	FF	FF
11111111	11111111	11111111	11111111	11111111	11111111	FF	FF	FF	FF	FF	FF
11000000	00000000	00000000	00000000	00000000	00000011	C0	00	00	00	00	03
11000000	00000000	00000000	00000000	00000000	00000011	C0	00	00	00	00	03
11000000	00000000	11111111	11111111	11111111	11110011	C0	00	FF	FF	FF	03
11000000	00000000	10000000	00000000	00000000	00010011	C0	00	80	00	00	13
11000000	00000000	10000000	00000000	00000000	00010011	C0	00	80	00	00	13
11000000	00000000	10011111	11111111	11111111	00010011	C0	00	9F	FF	FF	13
11000000	00000000	10000000	00000000	00000000	00010011	C0	00	80	00	00	13
11000000	00000000	10000000	00000000	00000000	00010011	C0	00	80	00	00	03
11000000	00000000	10011111	11111111	11111111	00010011	C0	00	9F	FF	FF	13
11000000	00000000	10000000	00000000	00000000	00010011	C0	00	80	00	00	13
11000000	00000000	10000000	00000000	00000000	00010011	C0	00	80	00	00	13
11000000	00000000	11111111	11111111	11111111	11110011	C0	00	FF	FF	FF	F3
11000000	00000000	00000000	00000000	00000000	00000011	C0	00	00	00	00	03
11000000	00000000	00000000	00000000	00000000	00000011	C0	00	00	00	00	03
11000000	00000000	00000000	00000000	00000000	00000011	C0	00	00	00	00	13
11000000	00000000	00000000	00000000	00000000	00000011	C0	00	00	00	00	13
11000000	00000000	00000000	00000000	00000000	00000011	C0	00	00	00	00	13
11000000	00000000	00000000	00000000	00000000	00000011	C0	00	00	00	00	13
11000000	00000000	00000011	11000000	00000000	00000011	C0	00	03	C0	00	03
11000000	00000000	00000111	11100000	00000000	00000011	C0	00	07	E0	00	03
11000000	00000000	00001111	11110000	00000000	00000011	C0	00	0F	F0	00	03
11000000	00000000	00001111	11110000	00000000	00000011	C0	00	0F	F0	00	03
11000000	00000000	00001111	11110000	00000000	00000011	C0	00	0F	F0	00	03
11000000	00000000	00001111	11110000	00000000	00000011	C0	00	0F	F0	00	03
11000000	00000000	00000111	11100000	00000000	00000011	C0	00	07	E0	00	03
11000000	00000000	00000011	11000000	00000000	00000011	C0	00	03	C0	00	03
11000000	00000000	00000000	00000000	00000000	00000011	C0	00	00	00	00	03
11000000	00000000	00000000	00000000	00000000	00000011	C0	00	00	00	00	03
11000000	00000000	00000000	00000000	00000000	00000011	C0	00	00	00	00	03
11000000	00000000	00000000	00000000	00000000	00000011	C0	00	00	00	00	03
11000000	00000000	00000001	10000000	00000000	00000011	C0	00	01	80	00	03
11000000	00000000	00000011	11000000	00000000	00000011	C0	00	03	C0	00	03
11000000	00000000	00000011	11000000	00000000	00000011	C0	00	03	C0	00	03
11000000	00000000	00000011	11000000	00000000	00000011	C0	00	03	C0	00	03
11000000	00000000	00000011	11000000	00000000	00000011	C0	00	03	C0	00	03
11000000	00000000	00000011	11000000	00000000	00000011	C0	00	03	C0	00	03
11000000	00000000	00000011	11000000	00000000	00000011	C0	00	03	C0	00	03
11000000	00000000	00000011	11000000	00000000	00000011	C0	00	03	C0	00	03
11000000	00000000	00000011	11000000	00000000	00000011	C0	00	03	C0	00	03
11000000	00000000	00000001	10000000	00000000	00000011	C0	00	01	80	00	03
11000000	00000000	00000000	00000000	00000000	00000011	C0	00	03	C0	00	03
11000000	00000000	00000000	00000000	00000000	00000011	C0	00	03	C0	00	03
11111111	11111111	11111111	11111111	11111111	11111111	FF	FF	FF	FF	FF	FF
11111111	11111111	11111111	11111111	11111111	11111111	FF	FF	FF	FF	FF	FF

4. Using the hexadecimal data, send the following code to print the graphic image as designed.

<ESC>A<ESC>H0100<ESC>V0100<ESC>**GH006006**

FFFFFF	**FFFFFF**	**FFFFFF**	**FFFFFF**	**C00000**	**000003**
C00000	**000003**	**C000FF**	**FFFFF3**	**C00080**	**000013**
C00080	**000013**	**C0009F**	**FFFF13**	**C00080**	**000013**
C00080	**000013**	**C0009F**	**FFFF13**	**C00080**	**000013**
C00080	**000013**	**C000FF**	**FFFFF3**	**C00000**	**000003**
C00000	**000003**	**C00000**	**000003**	**C00000**	**000003**
C00000	**000003**	**C00000**	**000003**	**C00003**	**C00003**
C00007	**E00003**	**C0000F**	**F00003**	**C0000F**	**F00003**
C0000F	**F00003**	**C0000F**	**F00003**	**C00007**	**E00003**
C00003	**C00003**	**C00000**	**000003**	**C00000**	**000003**
C00000	**000003**	**C00000**	**000003**	**C00001**	**800003**
C00003	**C00003**	**C00003**	**C00003**	**C00003**	**C00003**
C00003	**C00003**	**C00003**	**C00003**	**C00003**	**C00003**
C00003	**C00003**	**C00003**	**C00003**	**C00003**	**C00003**
C00003	**C00003**	**C00001**	**800003**	**C00000**	**000003**
C00000	**000003**	**FFFFFF**	**FFFFFF**	**FFFFFF**	**FFFFFF**

<ESC>Q1<ESC>Z

Note: Spaces shown in the hexadecimal listing above are for emphasis only. Spaces must not be encoded within the graphic portion of the data stream to the printer. Also, CR and LF characters to separate the lines must not be encoded in the data stream.

5. To send the data in binary format, the software must convert the data into binary format before transmitting it to the printer. Using the BASIC programming language for example, this is done by notation “CHR$ (&HC0)” which sends the hexidecimal value of “C0” as binary data (11000000). The BASIC program listing for sending this graphic to the printer (using the RS232 port) in binary format is:

```
CLS
OPEN “COM2:9600,N,8,1,CS,DS” FOR OUTPUT AS #1
E$ = CHR$(27)
PRINT #1,CHR$(2); E$; “A”; E$; “V0100"; E$; ”H0100"; E$; “GB006006";
PRINT #1,CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);
PRINT #1,CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);
PRINT #1,CHR$(&HFF);CHR$(&HFF);CHR$(&HC0);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H03);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HF3);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H80);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H13);CHR$(&HC0);CHR$(&H00);CHR$(&H80);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H13);CHR$(&HC0);CHR$(&H00);CHR$(&H9F);
PRINT #1,CHR$(&HFF);CHR$(&HFF);CHR$(&H13);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H80);CHR$(&H00);CHR$(&H00);CHR$(&H13);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&H80);CHR$(&H00);CHR$(&H00);CHR$(&H13);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H9F);CHR$(&HFF);CHR$(&HFF);
PRINT #1,CHR$(&H13);CHR$(&HC0);CHR$(&H00);CHR$(&H80);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H13);CHR$(&HC0);CHR$(&H00);CHR$(&H80);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H13);CHR$(&HC0);CHR$(&H00);
PRI NT #1,CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HF3);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H03);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H03);CHR$(&HC0);
```

```
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H03);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H07);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H0F);
PRINT #1,CHR$(&HF0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H0F);CHR$(&HF0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&H0F);CHR$(&HF0);CHR$(&H00);CHR$(&H03);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H0F);CHR$(&HF0);CHR$(&H00);
PRINT #1,CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H07);CHR$(&HE0);
PRINT #1,CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H03);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H03);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H03);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H01);
PRINT #1,CHR$(&H80);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H03);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H03);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H03);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H01);CHR$(&H80);CHR$(&H00);CHR$(&H03);CHR$(&HC0);
PRI NT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H03);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H03);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);
PRINT #1,CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);
PRINT #1,CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);
PRINT #1,E$; “Q1"; E$; ”Z"; CHR$(3)
CLOSE #1
```

The printer output for both the hexadecimal and binary format examples is:

PCX GRAPHICS EXAMPLE

A graphics file in a PCX format may also be transmitted to the printer. The file must not be larger than 32K bytes (DOS file size reported in a DIR listing). For example, the WIZ.PCX image shown below has a file size of 15076 bytes.

The uncompressed size (PCX is a compressed file) of the file must not be greater than 64K bytes. Generally this is not a problem unless the graphic image is surrounded by large amount of white space which the PCX algorithm can compress very efficiently. If this is the case, the file should be recaptured to eliminate the surrounding white space as much as possible.

The following basic program will send and print this file:

```
OPEN “WIZ.PCX” FOR INPUT AS #2
DA$ = INPUT$(15706, #2)
C$ = CHR$(27)
WIDTH “LPT1:”, 255
LPRINT C$; “A”;
LPRINT C$; “V150"; C$; ”H100"; C$; “GP15706,”; DA$
LPRINT C$; “Q1"; C$; ”Z";
CLOSE #2
```

The printer output for this program is:

APPENDIX D.
OPTIONAL ACCESSORIES

INTRODUCTION

This section contains instructions for using the following CL Series “e”optional features:

- Label Rewinder
- Label Cutter
- Label Dispenser
- PCMCIA Memory Expansion
- Internal Flash ROM Memory Expansion
- Calendar
- Interface Cards

LABEL REWINDER ALL MODELS

The rewinder is an external unit that allows for labels and tags to be rewound in rolls up to 8.5 inches in diameter. It derives its power directly from the printer’s EXT connector using a built-in cable. The rewinder provides the ability to rewind tags/labels from the printer and subsequently be unwound for later use with applicators.

Installation

1. Position the **Rewinder** at the front of the printer and align it with the label slot. (The **Rewind Wheel/Spindle** should be positioned away from the printer.)

2. Connect the built-in cable from the **Rewinder** to the EXT connector at the rear of the printer.

3. On the **Rewinder**, remove the metal clamp from the **Rewind Spindle**.

4. Feed the lead end of the label stock under the first spindle and onto the **Rewind Spindle**. Feed the stock around the spindle once, then replace the metal clamp over the label stock. Wind another revolution to ensure the labels are secure on the spindle.

5. Select the REWIND option on the rewinder, then set the power switch to ON. (The printer must be powered ON for the rewinder to function.)

Removing and Unwinding the Roll

As labels are printed, tension from the rewinder should keep the label stock taut as it wraps itself on the spindle.

To remove the roll from the spindle, first set the power switch to OFF. Remove the metal clamp, then remove the rewound roll of labels.

To unwind for using with an applicator, first set the power switch OFF. Attach the lead edge of the labels from the rewind spindle to the applicator entry point. Select the WIND option on the rewinder, and when ready to begin, set the power switch to ON.

LABEL CUTTER — ALL MODELS

The label cutter consists of an internal mechanism that will cut labels or tags as they exit from the printer. The cutter can be used to print labels of various lengths using continuous form label/tag stock or to easily separate labels when there is no perforation at the label gap.

Operator Setup

The following steps should be taken to set up the label cutter.

1. Install the label cutter, following the instructions provided with the unit. The installation time is approximately 20 minutes.

2. Power the printer ON.

3. The printer must be configured to use the **Label Cutter** option. Switches DSW3-1 and DSW3-2 on the front panel are used to configure the printer. To enable the cutter, **DSW3-1** should be in the **ON** position and **DSW3-2** should be in the **OFF** position.

4. Open the **Print Head Assembly** and feed the edge of the labels/tags into the cutter assembly and out between the label cutters.

NOTE: Although the cutting blade is fairly well protected, be careful as you feed labels into the cutter area. You may want to have the printer powered OFF at this point.

5. Close the **Print Head Assembly** and place the printer on-line.

6. The **Label Cutter** is ready for use.

7. Adjust the cut position using the backfeed adjustment procedures outlined in *Section 3: Configuration*.

General Operation

The data stream to be sent to the printer may need to be altered to add the Cutter Command. If this command is not used, the cutter will default to cut after every label assuming it has been enabled in the printer configuration. For more details, see *Section 5: Command Codes*. As the labels are printed, they will be cut based on the the data supplied using the cutter command.

LABEL DISPENSE OPTION — CL608e and CL612e

The CL608e and CL612e **Label Dispense Option** is an external mechanism that provides the ability to print labels in the "demand" mode. It is attached to rear of the printer with two screws and is connected to the internal drive mechanism of the printer. When the label dispenser is installed and configured for operation, the printer dispenses one label at a time, peeling the backing from the label, which allows for immediate application to the product by the operator.

Operator Setup

The following steps should be taken to set up the **Label Dispense Option**.

1. Install the option using the instructions provided with the unit. The installation time is approximately 30 minutes.

2. Power the printer ON.

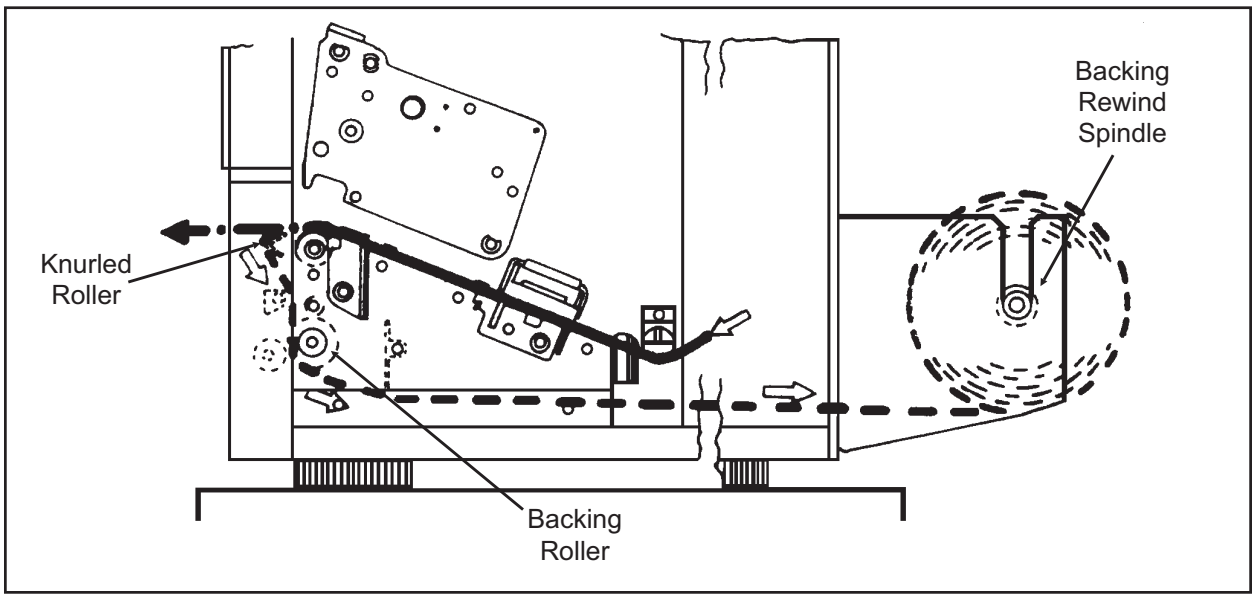
3. The printer must be configured to used the label dispenser option. Switches DSW3-1 and DSW3-2 on the front panel are used to configure the printer. To enable the dispenser, both **DSW3-1** and **DSW3-2** should be in the **ON** position.

4. Remove enough labels from the backing paper to provide 24 to 30 inches of backing free from labels.

5. Open the **Print Head** assembly and feed the backing paper through the print area in the normal manner.

6. At the label exit area, feed the backing paper down and behind the **Knurled Roller**, then back down and around the **Backing Roller**.

7. Feed the backing paper out the slot in the bottom rear of the printer and attach to the **Backing Rewind Spindle**.



Label Dispenser Routing, CL608e/CL612e

8. Close the **Print Head** and place the printer on-line.

9. The **Label Dispense Option** is ready for use.

LABEL DISPENSE OPTION — CL408e and CL412e

The CL408e and CL412e have an internally mounted **Label Dispense Option** which rewinds the label backing as the labels are stripped. When the **Label Dispense Option** is installed and configured for operation, the printer dispenses one label at a time, peeling the backing from the label, which allows for immediate application to the product by the operator.

Operator Setup

The following steps should be taken to set up the **Label Dispense Option**.

1. Install the **Label Dispense Option** using the instructions provided with the unit. The installation time is approximately 30 minutes.

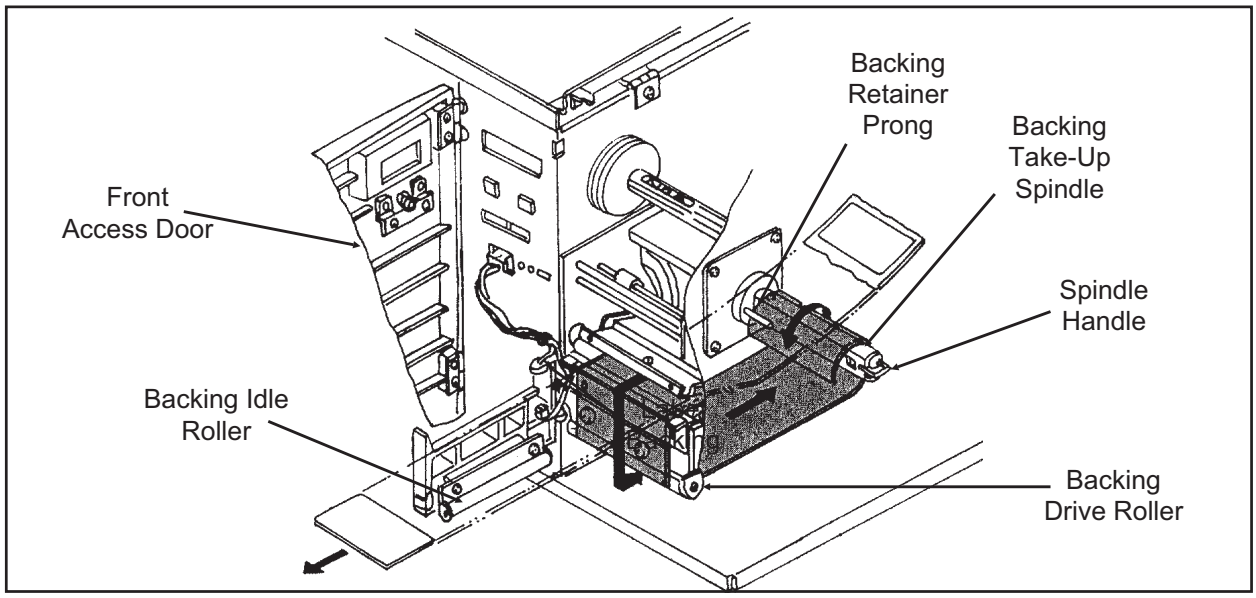
2. Power the printer OFF.

3. The printer must be configured to used the **Label Dispense Option**. Switches DSW3-1 and DSW3-2 on the front panel are used to configure the printer. To enable the dispenser, both **DSW3-1** and **DSW3-2** should be in the **ON** position.

4. Remove enough labels from the backing paper to provide 24 to 30 inches of backing free of labels.

5. Open the **Top Access Door** and the **Front Access Door**.

6. The **Backing Idle Roller** is held closed by the green **Front Access Door Latch** (the Front Access Door is held in the closed position by a magnetic latch when the **Label Dispense Option** is installed). Push down on the rear of the



Label Backing Path, CL408e/CL412e

Front Access Door latch until it releases and swing the **Backing Idle Roller** out of the way.

7. Open the **Print Head** and feed the backing paper through the print area in the normal manner.

8. Route the label backing down the front of the print mechanism and around the **Backing Drive Roller**.

9. Wrap the backing under and around the **Backing Take-Up Spindle**, routing it under the two retainer prongs.

10. Manually turn the **Backing Take-Up Spindle** counter-clockwise to take up all the slack in the backing.

11. Swing the **Backing Idle Roller** back into position until the **Front Access Door Latch** engages.

12. Close the **Front Access Door** until the magnetic latch engages.

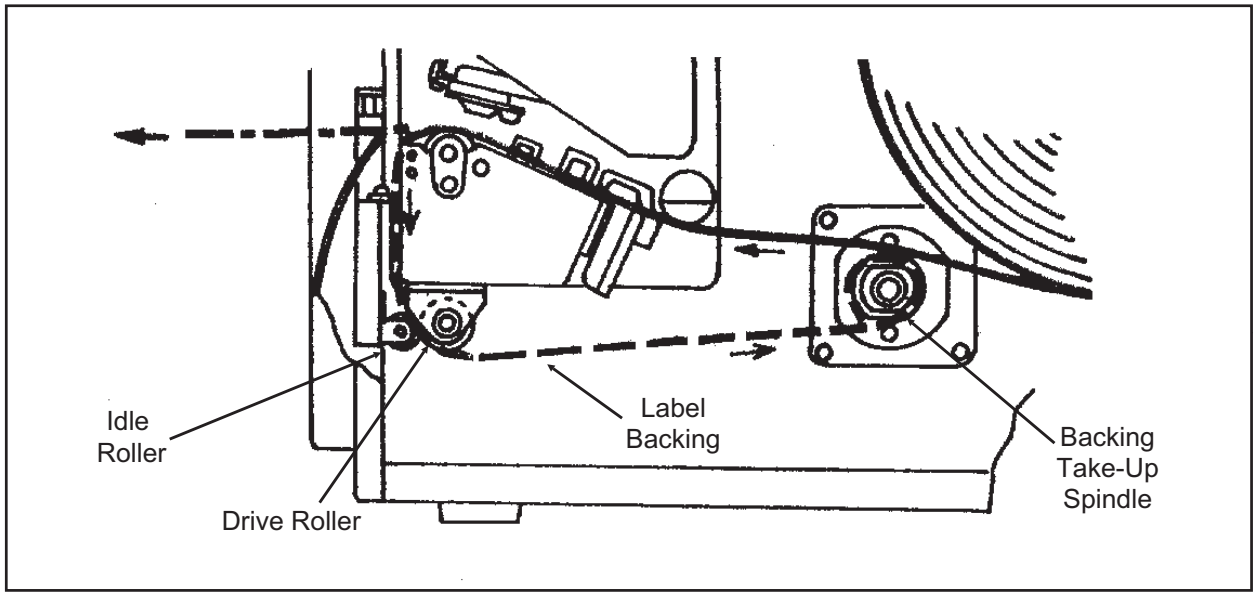
13. Close the **Print Head**.

14. Close the **Top Access Cover**.

15. To remove the backing from the **Backing Retainer Spindle**, pull outward on the green **Spindle Handle**. This will slide the rolled-up backing out from under the two retainer prongs, allowing the label backing to be easily removed and discarded.

General Operation

Send your data stream in the normal manner to the printer. Labels should print one at a time, even if your print quantity command requests more than one label. As the labels are printed and presented for the operator to remove, the backing paper will be



Label Dispenser Routing, CL408e/CL412e

rewound on the spindle. The next label will only print after removing the current label from the label exit path.

Note: The label dispenser will function only if it has been enabled using the front panel switches (DSW3-1 and DSW3-2 in the ON positions).

The **Label Taken Sensor** is adjusted at the factory for the optimal setting for most label material. However, the use of labels with a substantially different opacity may require that the threshold be adjusted. To adjust the threshold of the sensor, use the following procedure:

1. Turn the **Label Taken Threshold Potentiometer** (located to the right of where the **Label Dispense Option** connector is plugged into the front panel, all the way clockwise. Turn the **Power Switch** to the ON position while simultaneously pressing the **FEED** key. When the printer "beeps," release the **FEED** key.

2. Make sure there is no label in the **Label Taken Sensor**. Turn the potentiometer counter-clockwise until the LED illuminates.

3. Place a label in the **Label Taken Sensor** and check to see if the LED turns off. If it does not, turn the potentiometer clockwise until it goes off and repeat steps (b) through (c).

4. Press the **FEED** key and the printer will print a test label. Press the **FEED** key again to stop the printing and turn the printer OFF.

PCMCIA MEMORY CARDS — ALL MODELS

Description

The Memory Card Option provides the connectors and interface board for one PCMCIA memory card slot. The PCMCIA memory is selected for use via the <ESC>CC Memory Area Select command. It can be used to store fonts, graphic images and forms.

Type	SRAM or Flash
Applicable Specifications	PCMCIA Version 2.1 (JEIDA Version 4.1)
Size	Up to 4MB SRAM or 16MB Flash
Connector Pins	68
Battery	Approximately two years (manufacturer dependent)
Write Protect	Yes
Low Battery Detect	Yes

Installation

Instructions for installing the Memory Card Option are included with the installation kit.

Error Handling

Memory Card error conditions are indicated to the operator using a combination of the ERROR LED on the front panel, the LCD display and the audible indicator.

ERROR DESCRIPTION	INDICATION	REMEDY
Low Battery - Low battery condition is detected when printer is powered on.	ERROR LED: Blinking Audible Beep: 1 long Display: Card Low Battery Depress LINE key to print Card Status.	Replace Memory Card battery. Note that all data will be lost when the battery is removed.
Card R/W Error 1. No card is inserted. 2. Card is write protected. 3. Invalid store/recall number. 4. Card has not been initialized.	ERROR LED: On Audible Beep: 1 long Display: Card R/W Error Printer must be powered off to reset.	1. Insert card into selected slot. 2. Remove write protect tab. 3. Correct program 4. Initialize card with BJF command
Warning 1. Duplicate number. 2. Data not in print area. 3. Data overflows card memory.	Audible Beep: 1 short Display: None Printer will ignore invalid commands.	1. Correct program. 2. Correct program. 3. Use card with more capacity.

INTERNAL FLASH ROM MEMORY EXPANSION — ALL MODELS

Description

A factory installed option allows the internal FLASH ROM to be expanded from 2MB to 6 MB by adding an additional 4MB. It can be used to store fonts, graphic images and form overlays. The Expanded Memory is selected using the <ESC>CC Memory Area Select command. This option requires the installation of an Expanded Memory pcb and is a factory-only installed option.

CALENDAR

ALL MODELS

The **Calendar Option** allows the date and time to be maintained in the local printer rather than using the system clock. It consists of an integrated circuit module containing the clock components and battery and plugs into a socketon the main pcb assembly. A qualified technician should perform the upgrade as it requires modifications to the main PCB assembly. Please call SATO Technical Support if you need to add this option to an existing printer in the field.

PLUG-IN INTERFACE MODULES

ALL MODELS

The CL Series “e” printers have user changable Plug-In Interface Modules. The **Interface Module** is accessible from the **Rear Panel** and is retained by two screws. Use the following procedure to replace an interface molule.

1. Turn power off both the printer and the host and remove the power and interface cables.

   WARNING: Never connect or disconnect interface cables (or use a switch box) with power applied to either the host or the printer. This may cause damage to the interface circuitry and is not covered by warranty.

2. Remove the two **Interface Module Retaining Screws**.

3. Grasp the **Interface Module** and pull it out of the connector.

4. Place the new **Interface Module** in the slot and press inward firmly until it is properly seated.

5. Replace the two **Interface Card Retaining Screws**.

6. If the new **Interface Module** is for a serial interface, set DSW1 for the proper operation.

7. Connect the interface cable to the connector.

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APPENDIX E.
CUSTOM PROTOCOL COMMAND CODES

DESCRIPTION

This section contains information on creating custom Protocol Command Codes for operating the CL Series "e" printers. The Protocol Command codes are used to tell the printer that a specific type of information is being transmitted to the printer. As an example, the Standard Protocol Command Code specifies the use of an <ESC> character to tell the printer that the following character(s) will represent a specific command. Sometimes the host computer is unable to generate the character or it uses the <ESC> character to control another function. In this case, an Alternate Protocol Command Code set can be selected for use by placing DIP switch 2-7 in the ON position. When the Alternate set is selected, the <ESC> character is not used and is instead replaced with a "carrot" (^) character. A command stream would then start with an "^A" instead of an "<ESC>A". These two sets of Protocol Command Codes are adequate for the majority of all applications, but ocassionally situations occur where conflicts exist when using the Alternate set. In these cases, the user can define and download a custom set of Protocol Command Codes that are stored in EEPROM memory in the printer. After these are downloaded, they replace the Alternate Command Code set when DIP switch DS2-7 is in the ON position. When DIP switch DS2-7 is in the OFF position, the Standard Protocol Command Codes are used.

DOWNLOAD COMMAND STRUCTURE

The command for downloading a new set of Protocol Command Codes takes the form of <ESC>LD,a,b,c,d,e,f,g,h,i,j. The parameters specified for "a" through "i" can be transmitted in either ASCII characters or hex notation, allowing a complete 128 character (except for the ",") set to be used for selecting the custom code.

PARAMETER	STANDARD SETTING	ALTERNATE SETTING (DEFAULT)
a	STX	{
b	ETX	}
c	ESC	
d	ENQ	@
e	CAN	!
f	NULL	~
g	OFFLINE	]
h (Auto ONLINE)	No	0 = YES 1 = NO
i (Zero Slash)	No	0 = YES 1 = NO
j (Eurocharacter)	$D5_H$	User Defined

RESET

If the custom Protocol Command codes are incorrect or if the printer does not respond to commands using the custom set, the Alternate Protocol Control Codes can be restored by the following procedure:

1. Turn the printer off.

2. Place DIP switch **DS2-7** in the **ON** position.

3. Turn power on while simultaneously pressing the **FEED** and **LINE** switches.

4. When the message “ALT PROTOCOL DEFAULT COMPLETED” appears on the display turn the printer off.

   For printers that do not have a display panel and the completion of the Protocol Default is signified by a single “beep”. Once this beep is heard, then turn the printer off.

5. When the printer is powered up again, the Alternate Protocol Command Code set will be active. All previous custom settings will be lost.

DOWNLOAD PROCEDURE

The procedure for downloading a custom Protocol Command Code set is:

1. Reset the printer to the default settings using the Reset procedure.

2. Place DIP switch **DS2-7** in the **ON** position.

3. Turn the POWER switch ON while simultaneously pressing the **LINE** switch. This places the printer in the USER DOWNLOAD mode as signified by a “User Download” displayed on the LCD panel.

   For printers that do not have an LCD panel, you will hear a single “beep” signifying the printer is in the User Download mode.

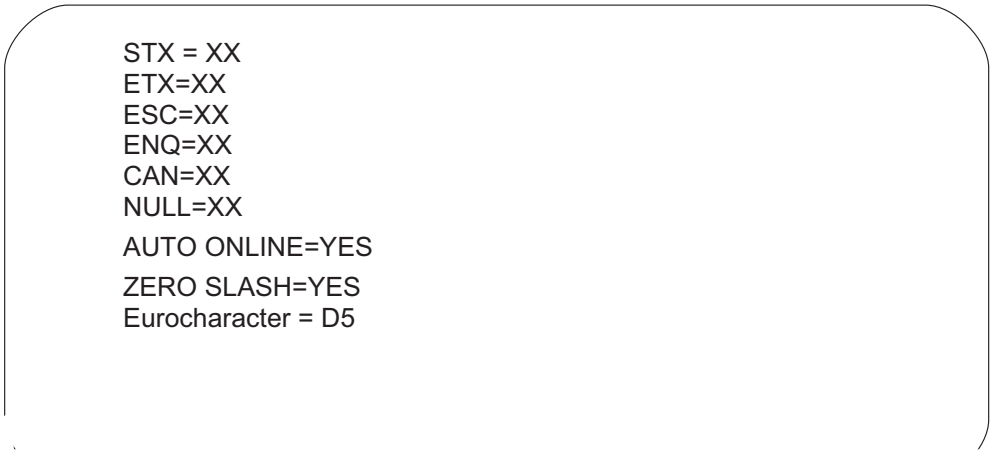
4. Set DIP switch **DS2-7** in the position to accept the Protocol Control codes to be used for downloading (i.e. DS2-7 = OFF for Standard codes and DS2-7 ON to use the Alternate set).

5. Press the **LINE** key to place the printer in the ON-LINE mode. The printer is ready to receive the download command data stream.

6. After the command has been sent, the unit will beep and print a status label. If it does not beep and print the label, the printer did not accept the data.

7. If the printer does not beep and print a setting label, turn the printer off, check your download command stream for errors and start the download process over at step 1.

8. If the custom codes are correct, press the **FEED** key to accept them and terminate the download process. If they are incorrect, turn the unit off without pressing the **FEED** key and begin the download process again at step 1.



See Custom Protocol Command Codes Download in *Section5: Programming Reference* of this manual for sample command stream.

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